THE ADMIRALTY & PORT AUTHORITIES. *See p. 553.*
THE TIME ELEMENT IN SHIP CALCULATIONS. *See p. 560.*

6 26

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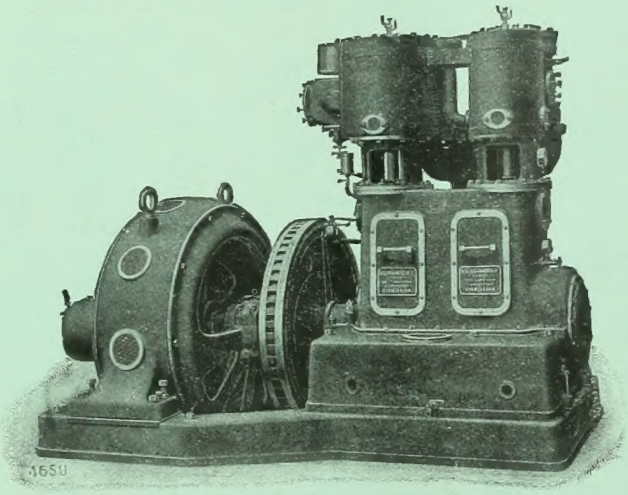

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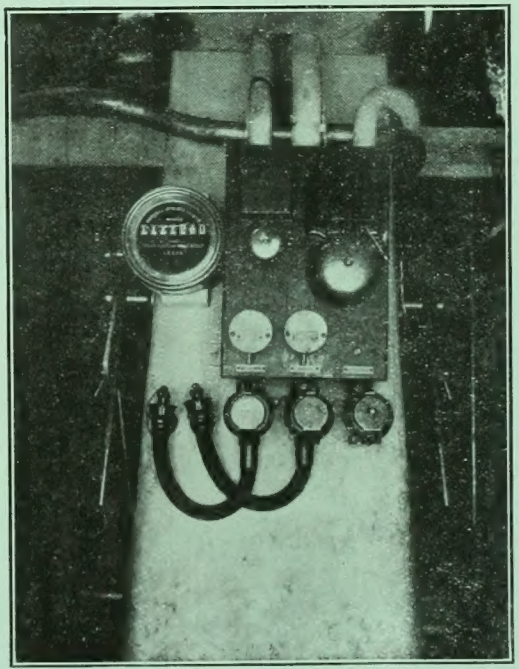

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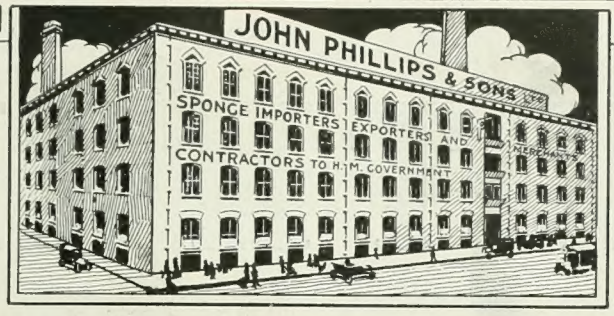

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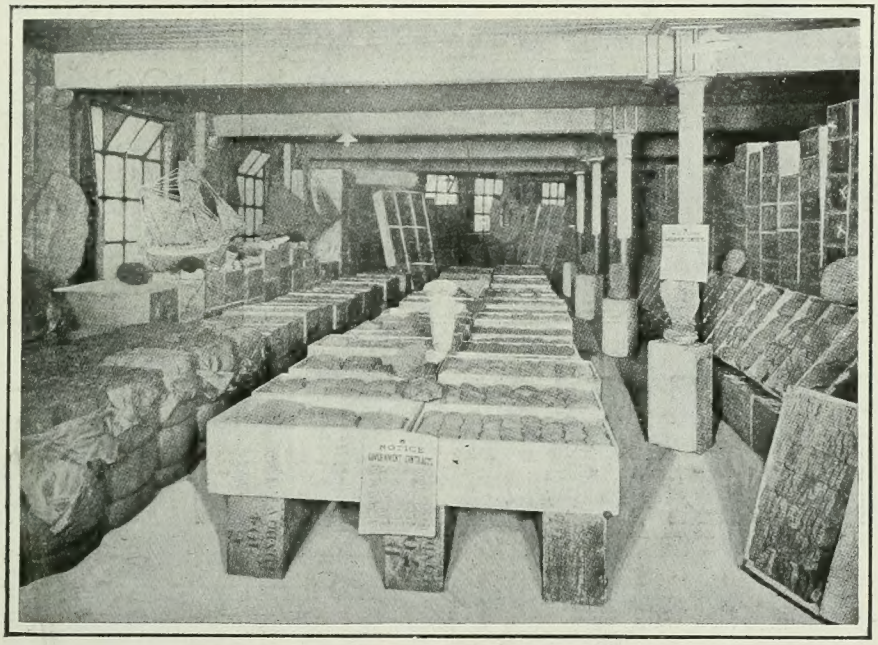

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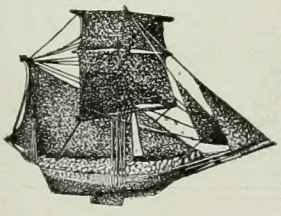

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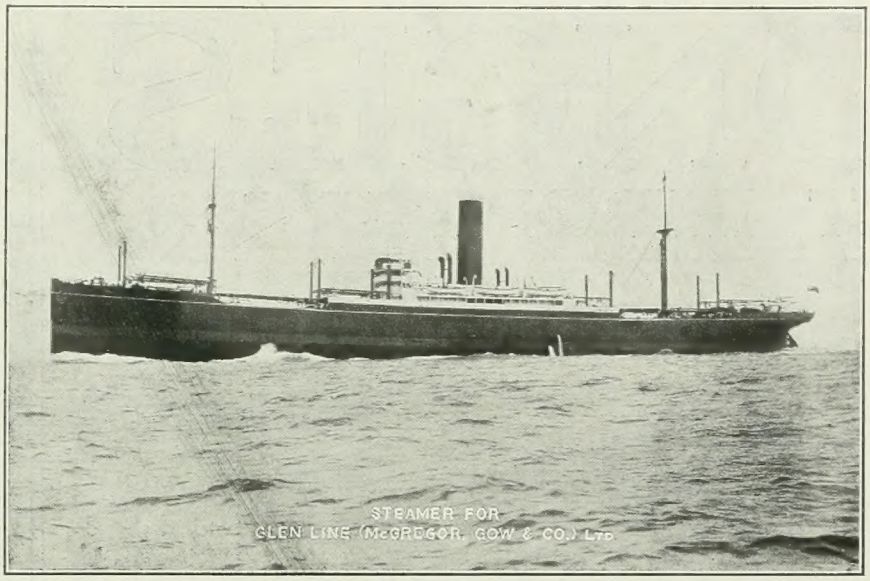

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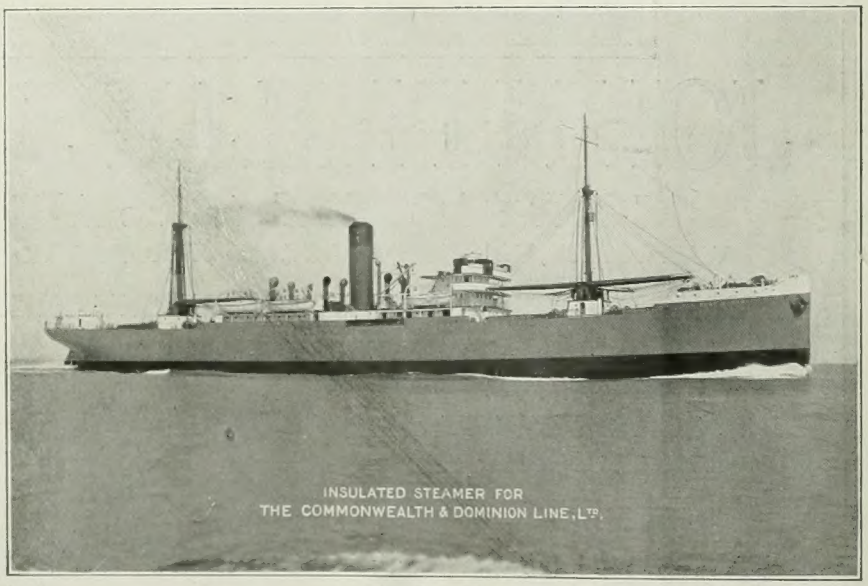

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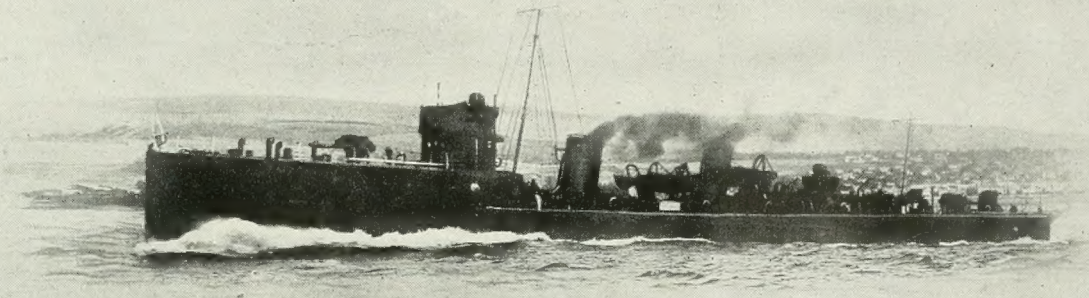

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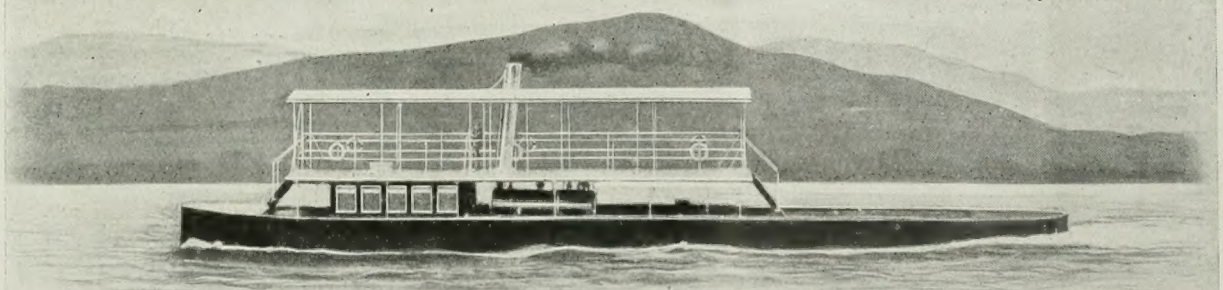

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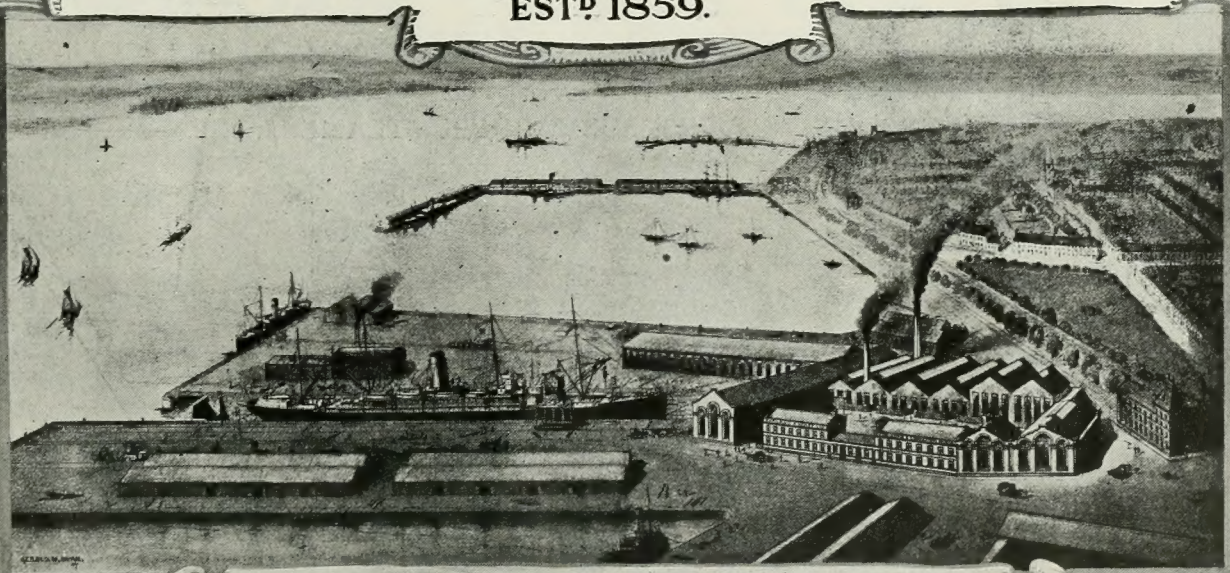

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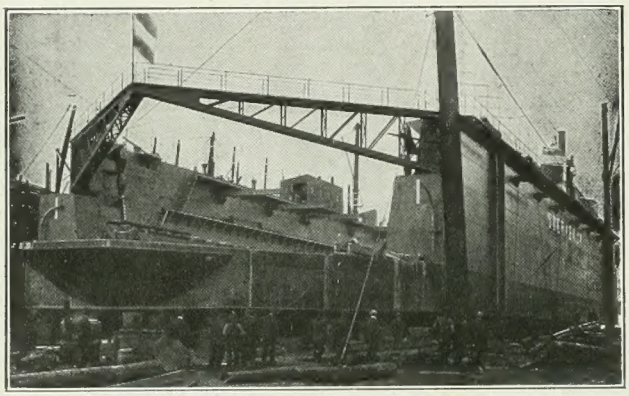

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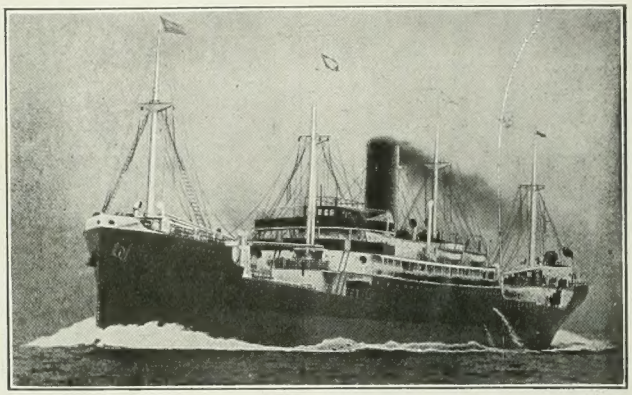

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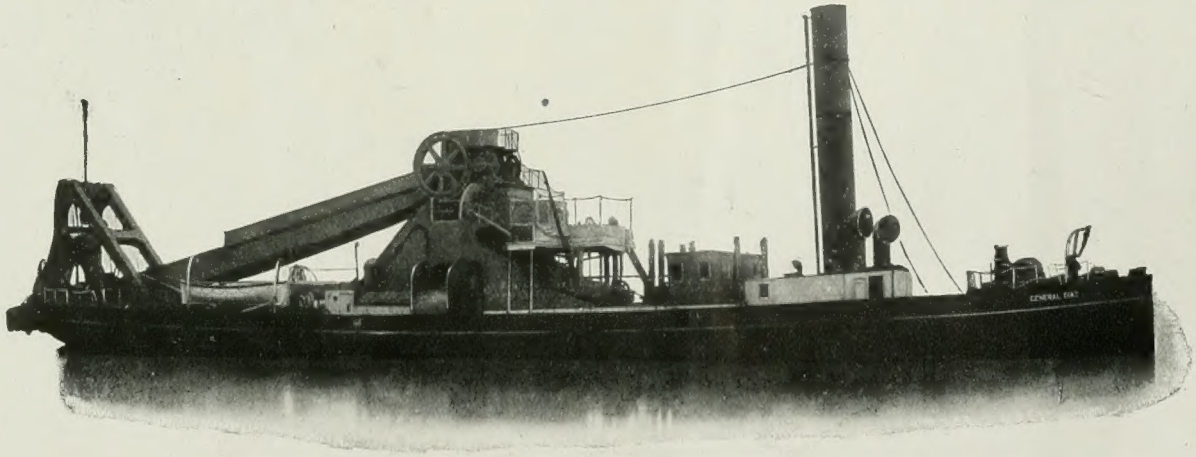

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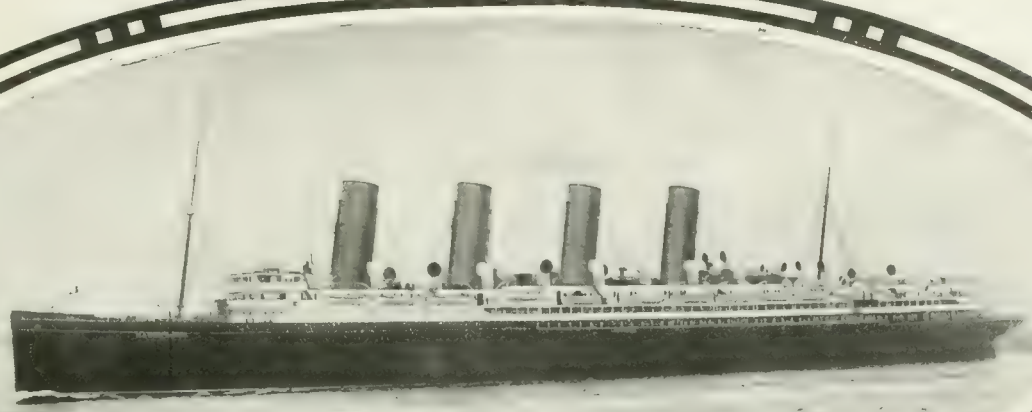

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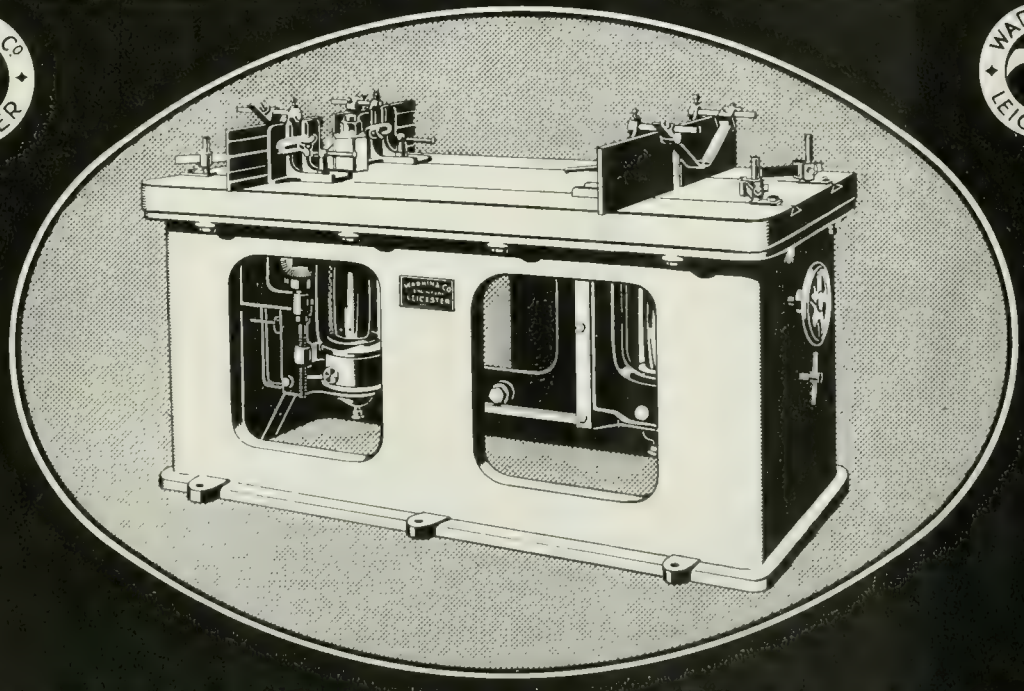

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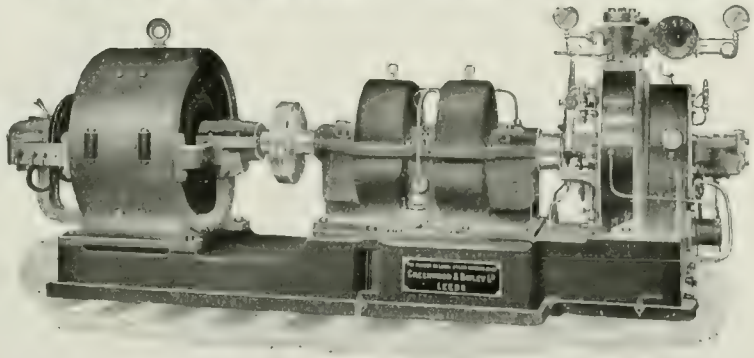

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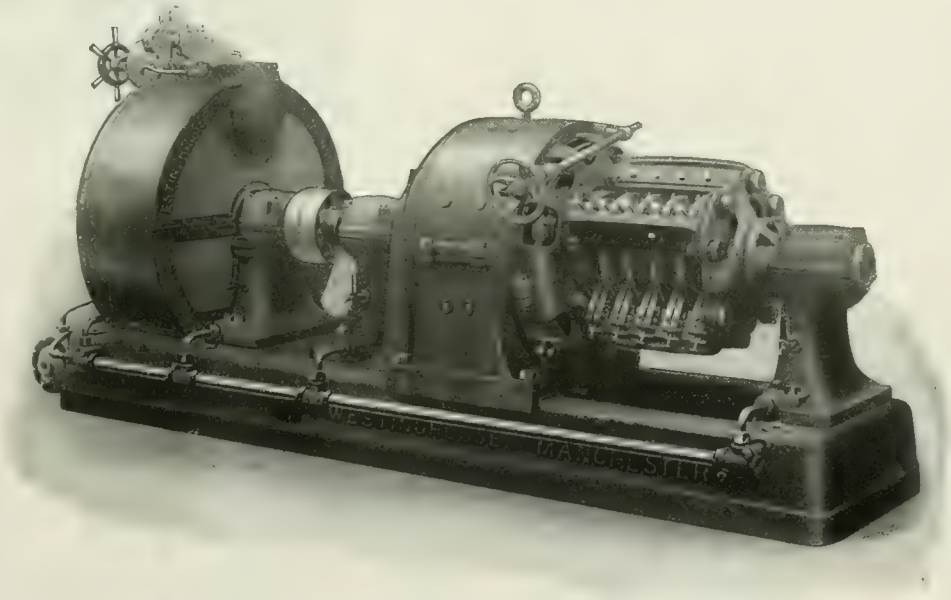

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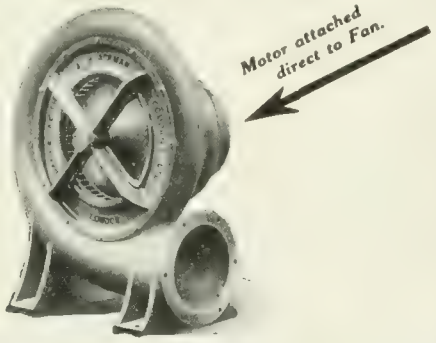

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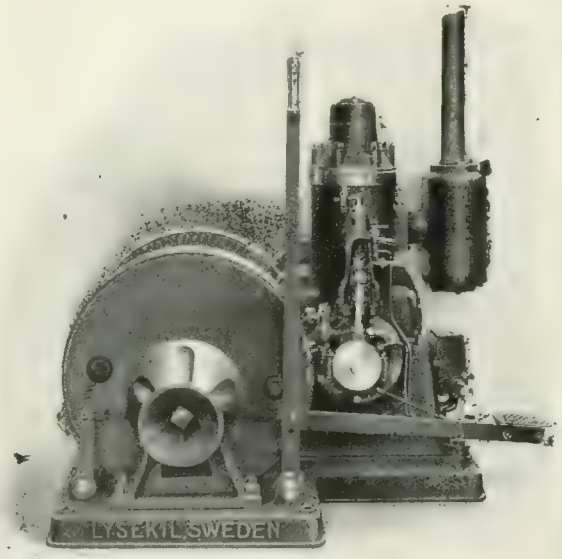

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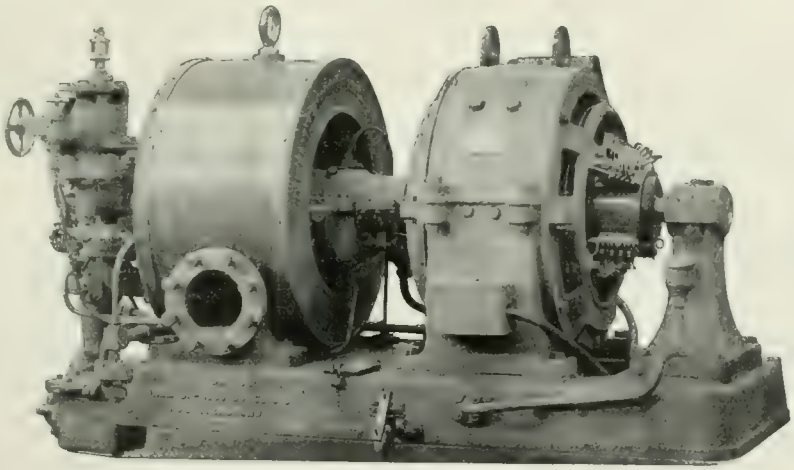

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SIGNS are not lacking of a serious situation in connection with the shipping trade of the Pacific, at all events as far as the transoceanic routes are concerned. The war is, of course, to a large extent responsible, as a large amount of British tonnage has been withdrawn for Government service in other directions, while vessels flying the German flag had to seek the security of home or neutral ports from which they have not emerged for nearly 17 months. American legislation has, however, made matters worse, seeing that as a result the fleets of the Pacific Mail and Great Northern companies have been sold, chiefly for employment elsewhere. True, three of the Canadian Pacific Empresses, which are now refitting at Hong Kong for their usual trades after completing their work for the Admiralty, will soon again be available, so that the position to this extent will be improved. At present, however, there are indications that the Japanese Government intends to take action once more with a view to commandeering all the cargo space on Japanese subsidised steamers for the benefit of Japanese merchants and commercial interests on both sides of the Pacific. If, as is likely, this policy is resumed, the effect on the maritime trade of other countries will be serious. The United States, in particular, will suffer heavily. This is, of course, mainly a question for the United States, but British shippers will not be unaffected, as events are likely to prove. Everything now depends upon the duration of the war, the close of which will, naturally, set free an enormous amount of tonnage for all the ocean routes.

Pacific Shipping Crisis.

Parliamentary pressure is being brought upon the Admiralty to take up a more generous attitude to port and harbour authorities in regard to the payment of harbour dues. Our information is to the effect that the outcome of the negotiations and representations may not be announced until after the Christmas holidays. An Act of 1847 exempted the Admiralty from the payment of these dues in respect to His Majesty's vessels, but between exempting warships and exempting the multitude of craft which the war has brought into the service of the Crown there is a wide difference. The Admiralty has indeed offered as a matter of grace to pay 75 per cent. of the regular payment in respect of transports and other mercantile vessels in its service, but even that is pressing the matter hardly on harbour and port authorities. Those bodies have their own obligations to fulfil. They must have adequate income if these are to be carried out satisfactorily. Thus if they received full payment on account of that part of the Admiralty ships represented by merchant vessels they would be only receiving justice. We have heard reports that the Admiralty is inclined to take another step in the direction of meeting the port authorities in regard to this dispute, and it is to be hoped that the negotiations will lead to a speedy and satisfactory conclusion.

The Admiralty and Port Authorities.

The breakdown of the steering gear of steamers has been a fruitful source of claims to underwriters in the past, and the recent casualties of this nature show that no improvement can be hoped for in the immediate future, at any rate. During the past week no less than five steamers have been reported with disabled steering gear. The *Maria Stathatos* has put into Halifax whilst bound from New York to Piræus. The *Musketeer*, bound from the United Kingdom to Marseilles, has been towed into Lisbon. The *Maria di Georgio* and *Thistleara* have both put into Bermuda, while the *Osterland*, bound from Newport to Buenos Aires, has sought refuge at Vigo. These delays are unwelcome to owners, shippers and underwriters alike, while salvage awards for towing disabled vessels are notoriously heavy. Of course the technical difficulties of safeguarding against such accidents are not apparent to the comparatively lay mind of the insurance market, but any improvement in construction which would obviate this trouble would be welcome indeed.

Underwriters and Rudder Troubles.

Some risks which have recently been done in the London market show to what an extent the lack of tonnage, combined with the high freights obtainable at the moment, have tempted owners to undertake voyages for which their steamers are totally unsuited. There is a steamer bound from New York to Archangel at the present moment on which a premium of 25 guineas per cent. has been paid for the voyage against the risk of total loss only. She was built in 1874 of iron, her registered tonnage being close on 2,000 and her engines are of the single-cylinder type with a nominal horse-power of 150. Another vessel of equal age and tonnage is bound home from the Red Sea, having successfully accomplished the voyage out, though in this case the engines are compound, with a nominal horse-power of 160, and new boilers were fitted about 15 years ago. A third vessel is making the voyage home from China, but she is a liner compared with the foregoing two, having triple-expansion engines of 338 n.h.p., her age and tonnage being practically identical. These risks are not of necessity unprofitable ones, at the rates asked for them; the old iron vessels have a wonderful reputation for standing heavy weather, and the policies being on the f.a.a. basis on arrival, means a profit of the full premium to the Underwriters, while the arrival of four out of five of such risks would enable the losses to be paid out of the premiums.

Some Ancient Steamers.

Lloyd's Requirements.

When a contract for the construction of a vessel in conformity with Lloyd's requirements for the 100 A1 class is entered into, the shipbuilder is entitled to take that as his standard without reference to the unspecified needs of any particular trade for which the vessel may be intended. We take that to be the meaning of the result of the arbitration and litigation in the case of the Australind Steam Shipping Company *v.* J. Lithgow and H. Lithgow. Messrs. Lithgow are eminent shipbuilders on the Clyde, trading under the name of Russell & Co. They built a large vessel for the plaintiffs, and it was stipulated that it was to comply with Lloyd's requirements. The vessel went into the Australian trade, and under stress of heavy cargo certain pillars gave way. The owners complained of the damage done, and the matter was referred to an arbitrator. He found that there was no breach of duty or contract by the builders in accepting and acting on the requirements of Lloyd's in regard to the foundations, and they were under no liability to the owners for what had happened. The owners submitted to the court that there was an implied warranty of fitness, but Mr. Justice Bailhache declined to interfere with the findings of the arbitrator.

Newcastle as a "Safe" Port.

In spite of the fulminations of the Germans in February last and their talk about a submarine blockade, one of the judges of the High Court has found as a question of fact that Newcastle was at the time a "safe" port. This finding arose out of the case of the Palace Shipping Company, Ltd., v. the Gans Steamship Line. The plaintiffs were the owners of the steamship *Frankby*, which was on time charter to the defendants. The charter party stipulated that the employment of the ship was to be between "a safe port or safe ports between 50 N. and 50 S." In February the vessel, in spite of the protests of the owners, proceeded from Havre to Newcastle and loaded a cargo of coals for Barcelona. She went safely down the North Sea and English Channel, and the log book showed no entries that the vessel had been in danger. Were the owners entitled to withdraw the *Frankby* from the service of the charterers? Mr. Justice Sankey laid down that the word "safe," when used in connection with "port," implied that the port must be both physically and politically safe. The action either of man or of nature might make a port unsafe. The dangers likely to be incurred on a voyage to a port might be taken into account in considering the safety of the port. But each case, in Mr. Justice Sankey's view, was a question of fact and degree. He pointed out that the number of arrivals in and sailings from the Tyne of oversea steamers of all nationalities was 752 for February. The number lost or damaged from enemy causes in the North Sea was three. Thus, in his view, Newcastle was a safe port within the meaning of the charter party. The action was accordingly dismissed.

Ambiguities in Shipping Documents.

Within the last week or two, an unusually large number of shipping cases has occupied the time of the Courts. The establishment of the Commercial Court, with its less elaborate procedure and its more rapid despatch of business, has no doubt been responsible for an increase in the last few years of litigation bearing on the construction of charter parties and bills of lading. We observe that in certain legal circles the advice is being given to business men who are concerned in those contracts of carriage that they would avoid much trouble and expense in the Courts if they would cultivate the use of precise and unambiguous language in their agreements. Of course this advice is all very good for members of the legal profession who in the preparation of documents have the time to ponder over the choice of words, and to revise the phraseology in the light of reflection. But the business man must as a rule act promptly, and if he failed to do so, the adoption of leisurely methods would deprive him of the loss of most profitable transactions. That he falls into ambiguous language at times is, of course, inevitable. We see that a case decided in the Court of Appeal recently is cited as affording an instance in which judges differ as to the meaning of a clause in a charter party. It ran:—"War risk, if any required, for charterer's account. It is understood and agreed that value for war risks at all times to be based on values stated in owner's annual policy." The vessel was sunk by a German cruiser, and she was uninsured against war risks. Who was to bear the loss? Mr. Justice Bailhache held that it was the charterer's duty to effect the necessary war risk insurance. The Court of Appeal, on the other hand, has just decided that what the clause meant was that the owners were to effect the insurance and the cost was to be borne by the charterers.

Time Charters and Requisitions.

Further cases bearing on the effect of Admiralty requisitioning on time charters continue to come before the Courts. The interpretation of the restraint of princes' clause lies at the root of a good many of the decisions that have been given. We have to record this week two other cases that shed light on a branch of shipping law in which no sufficient body of precedents existed for guidance. One of these cases concerns a dispute with regard to the tank steamer *F. A. Tamplin*, which was under a five years' time charter when the Admiralty requisitioned her. The vessel was subsequently structurally altered to fit her for the transport of troops. The owners contended that in these circumstances the charter party came to an end. The Court of Appeal, however, upheld the judgment that as the Government had altered the vessel, and as the charter party contained a restraint of princes' clause, the charter party was not determined by what had happened. We have still another aspect of the time charter problem presented in the action with regard to the steamer *Riversdale*. The Admiralty on requisitioning the vessel entered into negotiations with the charterers, but the owners declined to ratify a fresh charter party setting forth the terms of an Admiralty agreement. They now claimed that the action of the time charterers entitled them to cancel. The difference of opinion arising out of the circumstances was referred to an arbitrator. He found that the owners were not entitled by what had occurred to repudiate or cancel the charter. Mr. Justice Bailhache, in upholding the decision of the arbitrator, found that as the Admiralty rates of hire were higher than the charter party rates, the charterers were entitled to claim the difference as damages.

Persian Gulf Trade.

The events of the past few weeks have centred attention to a greater extent than usual upon operations in the Middle East. Our interest in the territories at the head of the Persian Gulf was at first chiefly an Indian interest, but with the capture of Basra a new campaign began—a campaign for the occupation of Lower Mesopotamia, the district between the Tigris and the Euphrates which we now hold. The development of merchant shipping on these two rivers has in the main been a British enterprise for over 80 years. In 1834, a firman of Sultan Mahmud conceded navigation on the Euphrates to Stephen Lynch, who left it 20 years later and betook himself and his steamers to the Tigris. For some years before the outbreak of war, there was a serious dispute between Messrs. Lynch and the Deutsche Bank concerning the right to transport the material necessary for the construction and working of the Baghdad Railway, of which the latter was one of the principal promoters, and after prolonged negotiations this was settled by the establishment of a new company, the Société des Transports Fluviaux en Orient, on the basis of their joint interests. It was, we believe, formed only as a transient concern to be merged later on into a permanent one, in which the Turkish Government would also participate. The war has, of course, altered the situation entirely, and it may be taken for granted that neither the Germans nor the

Turks will be given another chance of interfering. The result of the Mesopotamian campaign so far has been to put us in possession of an enormously rich province, but to deny us for the present the means of holding it securely, and of draining its riches to quarters which in the future it is hoped will be under British control. In that work the Euphrates & Tigris Steam Navigation Company, of which Mr. John F. Lynch is chairman, will, doubtless in association with other British shipping companies operating at Persian Gulf ports, take a prominent part.

U.S.A. Submarines.

The Secretary of the United States Navy appears to be opposed to the adoption of the 800-ton type of submarine in place of the 500-ton coast defence type in the forthcoming naval Bill. Service opinion there strongly favours the larger type. The points in favour of the larger type most often mentioned are its habitability and cruising radius. Theoretically the smaller type appears a reasonably good weapon, but in craft affording such poor living accommodation at best the factor of habitability becomes a serious tactical disability. Though Mr. Daniels contends that his programme is based upon reports from the European war zone, it is well known, says *Shipping Illustrated*, that the Germans have used the larger type of boat, which service opinion there favours, and the habitability of the German craft has added greatly to their efficient work on long cruises. Perhaps the real reason why Mr. Daniels favours the smaller type is that he can get more of them for the same money and thus, concludes our contemporary, have a larger number of them to show when advertising his accomplishments.

American Battle Cruisers.

Mr. Daniels, Secretary of the United States Navy, has recommended the adoption of a five years' building programme, involving the construction of almost 200 vessels, at a cost of $500,000,000. For the first time in the history of the United States Navy, it is proposed to build battle cruisers. Hitherto the possession of this type of ship has been considered unnecessary for their scheme of defence, but recent events have indicated the importance of the part which this type of ship may play in naval warfare. As Mr. Daniels points out in his report, it is a notable fact that in every naval event of consequence which has occurred in the North Sea area the leading parts have been taken by vessels of the battle cruiser and scout types, and it is evident that had either side lacked such vessels it would have been at a disadvantage. When the battle-cruiser type was first brought out, it was argued that it could lie in the line with battleships, but experience of the war seems to indicate that their primary function will be in independent action. At the present time Britain, Germany, Russia, and Japan are the only maritime powers with battle cruisers at their command or building. Considerable interest will be evinced when the size, speed, and gun power of the proposed new American ships become known. In probably no other direction of naval construction have such advances been made as in the design of vessels of this type, and the naval constructors of the various powers vie with each other in producing still better ships.

Propeller Problems.

It has been announced that a new sub-committee of Lord Fisher's Board of Inventions and Research has been formed, in order to investigate certain problems in connection with propellers that are engaging the attention of the Admiralty. Under the direction of Sir Chas. Parsons this committee is sure to do good work. Sir Charles himself has experimented with many types of screws, under diverse conditions, and has studied closely the cavitation problem which is so closely associated with high-speed screws. Mr. Sydney Barnaby, of Thornycroft's, is another member of the committee whose investigations into questions of propulsion have borne much fruit. It was in the destroyer *Daring*, built by Thornycroft, that the cavitation problem first became serious, and Mr. Barnaby has recorded the experiments carried out on that vessel, with complete success, to overcome the insidious effects of this phenomenon. His book on screw propellers is well known and he is an acknowledged authority on the subject. The other members of the Committee are also men of outstanding ability; their pre-eminence in the science of screw propulsion is, however, not so well established as that of the chairman and Mr. Barnaby. One is surprised that one of the greatest authorities on propellers, Mr. R. E. Froude, is not mentioned, but doubtless his knowledge is always at the disposal of the Admiralty, and he will probably be closely in touch with the committee during its investigations. It is common talk that some of the results obtained by peculiar types of craft which have been built have been rather unexpected, and these will form one of the subjects of investigation.

Stability During Bilging.

Professor Welch's paper, "The Time Element and Related Matters in some Ship Calculations," read last week before the North-East Coast Institution of Engineers and Shipbuilders, and abstracted on page 560 of this issue, deals with an important feature in bilging calculations. It is explained in the paper that there may be a time during the bilging of a ship when the initial positive stability disappears, but is restored again when the water in the bilged compartment reaches the level of that outside. During the period of instability considerable heel may take place, the amount of which may be determined by the methods he incorporates in his paper. The attention of the writer of this note was directed to this subject some time ago, when the stability during bilging of a large liner was investigated. By inclining the vessel through definite angles, the upsetting moments of certain quantities of admitted water, and the righting moments of the vessel at the same times, were calculated. By drawing curves of upsetting moments and righting moments, with various amounts of water admitted, on a base of degrees of inclination, the heel possible under certain conditions was obtained. The results of Prof. Welch's investigations point to the advisability of having greater metacentric heights than those desirable from considerations of easy rolling only. The recent accident to the steamer *Coonagh*, which capsized at Liverpool when water had been pumped into her to extinguish an outbreak of fire, is a striking illustration of the dangers to which Professor Welch draws attention to in his instructive paper.

Superheaters and Engine Details.

Discussing the subject of engine details where superheated steam is employed in marine practice the author of a recent paper read at a meeting of the Society of the Naval Architect's and Marine Engineers, remarked that steam chest valves on the high-pressure cylinder should be of the piston type with rings, wherever the degree of superheat is sufficient to eliminate all condensation through the first cylinder. Balanced slide valves on high-pressure chests have been in some instances satisfactorily operated, but, as a rule, if the temperature of the steam is 500 deg. or more, piston valves are generally recommended. For the intermediate chest of triple and quadruple engines, or the low pressure of compounds, piston valves are desirable, but well-balanced slide valves, if properly provided with grooves for oil lubrication, have been successfully used. For the low-pressure chest of triple and quadruple engines, it would appear safe to use slide valves. The steam temperature, even with high initial superheat, to which the low-pressure valves will be exposed is but little, if any, above saturated steam operation. Engine cylinders and liners must be of first-class, close-grained cast iron, as hard as can be worked. Iron, as a material, for these details, has been proven to be entirely suitable for high superheat. It is well known that cast iron does not lose strength, but, on the contrary, the strength increases slightly when exposed to temperatures up to about 800° Fahr. It is probable that under exceptionally high temperatures cast iron may "grow," but, within the range of temperatures to which steam

chests and cylinders are subjected with superheated steam, no appreciable change will be found. If this were really a serious matter the number of superheated steam marine plants would not be increasing at the present rate. No fear need be entertained, therefore, that there will be deterioration of these parts, due to steam temperatures up to 650 or 700 deg. That this is borne out by facts will be indicated by the satisfactory operation of steamships using superheat in excess of 200 deg., as referred to above.

THE AMERICAN MERCANTILE MARINE.

WHILE the war drags on its course the shortage of mercantile onnage becomes more and more manifest not only to ourselves but also to neutrals and in particular the United States. The immediate effect of the war in this direction resulted, as is common knowledge, in the hastily passed Act permitting the admission of foreign built ships to American registry. This has resulted so far in considerably more than half-a-million tons of shipping being added to the American merchant marine, although the embargo placed by the Allies and subsequently by many neutrals on the transference of ships is likely to reduce the rate at which such vessels can be acquired by the States.

The other proposal by President Wilson to form a state-owned fleet meets with varied success and in some quarters violent opposition. Our New York contemporary, *Shipping Illustrated*, describes the scheme which the President outlined in his message to Congress recently as the result of lack of full information, and that he has not yet succeeded in considering the shipping problem as a distinct and separate branch of foreign trading, with the object of encouraging the operation of deep sea carriers by Americans. To achieve this ideal it would be necessary for the Government to give its support to any form of private enterprise having as its object the investment of capital into ships. Instead of this, the novel proposal is advanced that the Government should first step into the breach and leave the field to private enterprise only after the routes have been opened up. But to begin with, ships do not open up new routes. The sea routes are opened and the ships are sent merely to the places where goods are to be delivered. Therefore, sales must in every case precede transportation, except when the goods are consigned to foreign agents to be sold later. The ideas underlying the school of thought of which the President is the most distinguished exponent, presuppose on the contrary the existence of a state of things whereby the seller retains title to the goods which he has sold until they reach their foreign destination. An amusing passage in the message was the reference to deep sea carriers as ships of peace, "creating friendships and rendering indispensable service to all interests on this side the water." "Evidently," concludes our contemporary, "the President clings to the time-worn fallacy that commerce creates friendships, when we have the ghastly shambles of Europe as a demonstration of the knowledge derived from private experience that those who do no business together seldom find ground for a quarrel. We do not quarrel with strangers, but neighbours are a constant source of annoyance, and if a pretext must be found for the commitment of this nation to the principle of Government-ownership of shipping, a better excuse needs must be found than the promotion of peace. We have gotten on tolerably well, as far as peace is concerned, under the old order of things, and if it pleases our lords and masters to decree that Americans shall not be allowed to operate regular lines with Government assistance, the intolerable abuse which such policy should entail ought not to be predicated on the false assumption that it is conducive to peace. Such high falutin will not fool anybody."

It is obvious, moreover, that much will have to be done in the way of amending the provisions of the American Seamen's Act, which seems to be less popular among shipowners in the States even than in other countries, for with the heavy costs of maintaining American shipping a big expansion of their overseas fleet is not likely.

EMPLOYERS AND MUNITIONS LEGISLATION.

FAR and away the longest clause in the Munitions of War Amendment Bill was the fourth, which provided for the alterations of Clause 7 of the principal Act, to which we alluded a week ago. It related to certain new procedure to be followed in the matter of clearance certificates. In Committee Mr. Pringle moved to omit the whole of it—not because he objected to the relaxations contained in the clause but because he objected to the original Section in the principal Act. The clause slightly amended was, however, after some discussion, adopted by the Committee.

In the course of his speech, Mr. Pringle raised a question which ought not, we think, to be allowed to rest where the discussion left it. "The shipbuilders and engineers employers' federations say," he observed, "that they take no responsibility for the original Act, nor do they take any responsibility for the amending Bill. They believe that, as in the case of the original Act, this Bill was drafted practically without consultation." Exactly what Mr. Pringle meant by the words "without consultation" is somewhat obscure. From a very early stage in the drafting process the trade unions were consulted. The opinion of the National Advisory Committee on War Output—which is a Labour body—was, at any rate, taken on the proposals. Probably the idea Mr. Pringle desired to convey was that neither the Shipbuilding Employers' Federation nor the Engineering Employers' Federation was consulted as to the Bill. A general impression exists outside of Parliamentary circles that they were not.

"I agree," said Dr. Addison, by way of rejoinder to Mr. Pringle, "that the employers' representatives certainly take no responsibility for what is put into the Bill, but we were not pressed to rescind the principles of the original Act with any considerable pressure. The whole responsibility for what is in the Bill rests solely on the Government." "Were the employers consulted?" asked Mr. Watt. "Certainly they were, and a considerable number of alterations were introduced in view of the representations made by the employers."

Whether the employers to whom Dr. Addison alluded were consulted individually or through their federations is not very clear. We are also left in ignorance as to what principles of the original Act they half-heartedly pressed the Ministry of Munitions to rescind. But it is made tolerably clear, we think, that what any employer had to say regarding the principles of either the original Act or the amending Bill did not carry much weight with the Ministry of Munitions. No employer has been heard to complain of that. A good many are, however, inclined to demur to the suggestion that they were seriously consulted or that their interests as employers were taken into account at all by the drafters of either the Act or the Bill. The legislation is wholly the Government's, and it is entitled to all the credit or discredit there will be for it.

Here is a characteristic example of the tender care of employers' interests taken by Mr. Lloyd George's Department. Clause 4 Sub-Section 5 of the Bill was as follows:—"In determining whether the grant of a certificate has been unreasonably refused for the purposes of Section Seven of the principal Act as amended by this Section, a munitions tribunal shall take into consideration the question whether the workman has left or desires to leave his work for the purpose of undertaking any class of work in which his skill or other personal qualifications could be employed with greater advantage to the national interests." To that Mr. Wilkie in Committee proposed to add the words:—"And whether the workman has left or desires to leave his work because he has recently completed a term of apprenticeship or period of leaving his trade or occupation and desires to obtain the full standard rate of wages applicable to fully qualified workmen in his trade or occupation." "I accept that amendment," said Mr. Lloyd George, and it was at once agreed to.

In about a minute, that is to say, the "improver" was abolished in shipbuilding and engineering, although there are districts of the

United Kingdom in which improvers' rates and conditions are the subjects of agreements between employers' associations and trade unions. Many similar instances of absolute disregard for the interests of the industry are in the legislation, and the trade unions will take care, we may be sure, to see that as much as possible is made of them when the war comes to an end. Of these, the most glaring is perhaps the proposed addition to Sub-Section one of clause 11 of the principal Act. How this appears in the amending Act we do not at the moment know, but in the Bill the proposal was to give the Minister of Munitions power to demand from "any establishment in which persons are employed" costs of production, costs of material, "and the names and addresses of the persons by whom such materials were supplied or who are under contract to supply them."

It would be interesting to know whether employers were consulted about that amendment, and, if any were, what they had to say about it. To be quite frank, we think that one or both of the employers' organisations indicated by Mr. Pringle should make clear what part, if any, they have taken in the framing of the legislation. Employers generally are doing excellent work for the Empire under very difficult conditions, but it will not help them much, when their industries revert to their normal conditions, to have an impression made on the public now that the munitions bills were agreed bills so far as they were, individually or collectively, concerned.

THE AIR PUMP AND ITS FUNCTIONS.

AS doubt may still exist in some minds regarding the real duty of the air pump, it may be of advantage to discuss briefly the function of this essential accessory to every condensing plant.

To obtain a good vacuum in a condenser, the following conditions are necessary :—

(1) An ample supply of cooling water for condensing the exhaust steam.
(2) Rapid condensation of the exhaust steam.
(3) Rapidity in removal by the air pump of the air leaking through the joints of the exhaust system and into the condenser.

The rapidity with which the steam is condensed on the tube surface depends—among other things—on the amount of air contained in the condenser, and in order to obtain the maximum efficiency of the cooling surface, this must be reduced to a minimum. The air pump, whose function it is to deal with the contents of the condenser, should be capable of removing as rapidly as possible the air leakage. This air leakage in any condensing plant should be reduced to a minimum by careful making of all the joints in the system, but so long as leakage exists in any form, the vacuum obtainable depends to a great degree on its removal by the air pump. For a given condenser vacuum, the temperature of the entering steam depends almost entirely on the absolute pressure corresponding to the vacuum, but the temperature of the condensate and vaporised air, which is dealt with by the air pumps, is dependent on the proportion of air contained in the condenser space at the air pump suction. The greater the quantity of air, the lower is the temperature of the condensate and therefore the larger is the temperature loss in the condenser. The resultant pressure in a condenser is equal to the sum of the air and vapour pressures, but the vapour pressure is dependent on the temperature of the condensed feed water, and therefore for a given vacuum it is necessary to reduce the air pressure to a minimum in order to obtain a temperature of feed water approaching that corresponding to the vacuum. With the ordinary wet air pump which deals with both the feed and air mixture, it is necessary in the case of high vacuum to cool the contents before entering the pump, otherwise the capacity of the pump would generally become excessive; but this cooling constitutes a thermal loss, and in order to avoid this it is now the general practice in all high vacuum plants to provide separate pumps, one for dealing with the feed water only, which is usually called the wet pump, and the other for the air and vapour mixture, which is called the dry pump. With this arrangement the air volume can be reduced in the dry pump by means of a cold water spray without any cooling of the feed water, and thereby increases the efficiency of the condensing plant. This principle of separate pumps has been used for a number of years by the well known firm of G. & J. Weir, of Cathcart, and has proved very satisfactory.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by Correspondents.*]

THE CORRUGATED SHIP.

December 17.

To the Editor of Shipbuilding and Shipping Record.

Having read the correspondence under the above heading I would draw your attention to a point which is somewhat misleading. The correspondence has reference to the type of ship advocated by the Monitor Shipping Corporation, Ltd., but I would point out that this is not "the corrugated ship." There have been several patents for purely corrugated ships, but that referred to by Mr. Haver is not one of these. The basis of his ship is a recessed sided ship, with the recesses confined to a position at or near the water line, they have an alternative for forming these recesses, which is by forming bulges on the sides of the ship (see his patent specifications), actually two bulges have been used which extend for about 13 ft. down the side from the load line. These bulges give a kind of corrugated appearance, but only for the portion mentioned and for about three-fourths of the length of ship. It is perfectly clear that theirs is not "the corrugated ship," at the most it is only a partly corrugated ship.

Mr. Haver makes a strong claim to reduce propelling power by means of his recesses. Now I know of several cargo ships which are running at good speeds of 10 to 11 knots, with constants of over 300, plane-sided ships, without any recesses on the sides, and it would be interesting to know if Mr. Haver would be prepared to guarantee, under a penalty of refusal to take the ship, a reduction of 16 per cent. in the propelling power, in the case of an existing plane-sided ship, which carries regularly about 5,000 tons d.w., at 9 to 9¼ knots per hour, with 850 i.h.p., *i.e.*, to build and fit a new ship of exactly similar size and lines, with his recesses and to do the same work with 715 i.h.p. The present constant $\frac{D^{2/3} \times V^3}{P}$ is about 315; Mr. Haver's would work out at about 365. The ship referred to also does 10¼ knots per hour loaded with 1,150 i.h.p., the constant being about 315, thus Mr. Haver's guarantee should cover for doing this speed with 970 i.h.p. (16 per cent. less). Mr. Haver may reckon on a bronze propeller.

It is my opinion, as is indicated by the above ship, that by careful designing of proportions of the hull dimensions, displacement and lines, much can be done in the way of reducing the propelling power. I think Mr. Haver cannot improve the above, but if he is prepared to make the guarantee let him say so.

NAVAL ARCHITECT II.

Norwegian Shipping Enterprises.—A provisional decree has been issued in Christiania placing restrictions on the purchase of shipping by Norwegian subjects. Hitherto there has been a prohibition placed on the purchase of foreign vessels more than 30 years old, while all vessels more than 20 years old were required to be registered with an established society. By the new provisional decree Norwegian subjects are prohibited from buying foreign ships more than 15 years old and of such a size that they require to be registered, unless permission to do so has been given by the Foreign Office.

ALTERNATIVE TYPES OF PROPELLING MACHINERY FOR A 19¼-KNOT STEAMER.

In our issue of November 18 we published an interesting paper which was read before the Institution of Engineers and Shipbuilders in Scotland, by Mr. James Dornan, entitled "Some Alternative Types of Propelling Machinery for a 19¼-knot Steamer." At a recent meeting of the Institution this paper formed the principal subject of discussion, and the views expressed on that occasion should be of interest to all shipbuilders, marine engineers and shipowners.

Mr. Percy A. Hillhouse, B.Sc. (Fairfield Shipbuilding Company), who opened the discussion, said that Mr. Dornan had treated the subject in the right way—he had given ample information and he had gone into every point very fully. One question he would like to ask Mr. Dornan was: How, when working out the e.h.p. from Taylor's curves, did he make allowances for the differences in appendages? Taylor's curves applied to the naked model only, and in order to use them correctly it would be necessary to work with displacements and draughts reduced by the removal of the appendages. It would be interesting to know exactly how that had been done. Mr. Dornan said that certain designs were credited with less e.h.p. than other designs on account of the better form resulting from four-shaft ships. Did that mean that the naked model was of better form because the ship was going to be equipped with four shafts? There was also a general statement made regarding the height of the centre of gravity of the machinery, which he considered somewhat open to criticism. Mr. Dornan said that, although the various types of machinery were of different weight yet their moments were about the same. As the weights differed considerably, this meant that the centre of gravity must be higher where the weight was less. For instance, assuming that the reciprocating machinery of design A had a height of centre of gravity of 18 ft., the turbine machinery of design B would have its centre of gravity 22¾ ft. up, and the centre of gravity of the Ljungstrom installation would go up to 28 ft. 6 in. The centre of gravity of vessel G with Ljungstrom turbines would be about 3¼ ft. higher than design A with reciprocating engines, which would make a very great difference in the stability in the light condition and would probably necessitate an increase in breadth, or it might be found advisable to reduce the displacement in order to throw up the metacentre, and this even if the Ljungstrom turbine had the same height of centre of gravity as the reciprocating machinery. The centre of gravity of design G, owing to the lesser weight of machinery, would be 1½ ft. higher in the light condition than for ship A, which would make a serious difference in the light G.M., and something would have to be done by increasing breadth or reducing displacement in order to counteract that effect. Mr. Dornan showed the increases of deadweight, as compared with the ship having reciprocating machinery, and he also showed the increases of cubic capacity. Dividing cubic capacity gained by the deadweight gained, the rate of stowage for the new cargo was found to be 22 cubic ft. per ton for vessel B, 46 cubic ft. per ton for vessel C, and 35 cubic ft. per ton for vessel G. It would be practically impossible to get cargo that would stow so densely. Of course, it would not be necessary to stow the new deadweight in the new space, but even if the average stowage throughout the holds were considered and the initial rate assumed to be 100 cubic ft. per ton for ship A, it would be found that only 71 cubic ft. were available per ton in ship G. The average cargo on the Atlantic route was a great deal lighter than that. In the Ljungstrom turbine ship it would not be possible to utilise all the increase in deadweight owing to want of stowage space, and probably some compromise would have to be adopted by fining the lines of the ship, so as to throw up the metacentre, at the same time reducing the deadweight, and obtaining a stowage rate more like what would be experienced in practice.

Mr. W. D. McLaren said the subject matter of Mr. Dornan's paper provided very interesting comparisons between the many competitive systems of machinery now advocated for ship propulsion. It was only by making such comparisons, based preferably on the data accumulated from many years of working of actual ships of about the same size and power, that one was enabled to judge of the merits of the different types of propelling machinery. Mr. Dornan had not, however, had the simple task of merely tabulating such data, but he had to base some of his conclusions upon information derived from widely different classes of vessels. While appreciating the completeness of Mr. Dornan's investigations, he felt that as many of the figures were speculative the paper offered scope for fuller investigation. Mr. Dornan selected a vessel of such size and speed that all the schemes proposed were feasible, whereas with a vessel of lower or higher speed certain of the types would have to be dropped as being impracticable. He presumed that the principal object which Mr. Dornan had in view in preparing his paper was to demonstrate the gain which would accrue to a shipowner from the adoption of machinery of design G, and as this advantage seemed to depend entirely on the greater efficiency possible with this class of machinery, he would criticise this feature first. He did not propose to compare the turbo-electric gear G with other than the mechanical gear F. The first thing that called for comment was that in the former the revolutions were chosen at 85 per min., and in the latter 160 per min., therefore in G the twisting moment on the propeller shaft was practically twice as great as in F. Mr. Dornan stated that it was only by the adoption of not less than 160 r.p.m. that in design F he found it possible to use twin screws, because of the excessive loads that were to be carried by the wheel teeth. It was, however, obvious that if he desired to use the same diameter of wheels in design G the load on the teeth must be twice as great. There was no such suggestion conveyed by examination of the arrangement of machinery in the design, and in no part of his paper did Mr. Dornan deal with this difficulty. The net result in this change in revolutions was that he got improved propeller efficiency and so saved 1,350 h.p. He was of opinion that difficulty would be experienced in making provision for transmitting the great torque through the propeller shaft in design G if the ordinary arrangement of gearing was employed. The next saving was traced to the fact that the steam consumption per horse-power per hour of the main engines was only 7·4 lb. Working from the data supplied, viz., 200-lb. pressure, 260° Fahr. superheat, and 28½ in. vacuum, this necessitated a turbine efficiency based on the Rankine cycle of 83 per cent. He was aware that the Ljungstrom turbine showed a higher efficiency than any other which had been constructed, but he would be somewhat chary in placing it at this figure for continuous service conditions. With regard to the use of highly superheated steam, he was inclined to think that the improvement in coal consumption to be derived after a certain degree of superheat was reached was not so great as would seem to be indicated from the benefit obtained from moderate superheat. Thermodynamically the gain in efficiency was not very great, the hypothetical figures being 31·0, 31·4 and 31·3 per cent. for 0°, 100° and 260° Fahr. respectively. Of course, the actual efficiencies need not bear these relations. With reference to Mr. Dornan's method for computing the power required for propelling the vessels, he noted that he gave propeller efficiencies for the model and then for the actual propeller. The latter were given with apparent exactness as three significant figures were used, but he would like Mr. Dornan to state how these actual efficiencies were obtained. The same remark applied to the mechanical efficiencies. Mr. Dornan stated that no difficulty should be experienced in obtaining propellers of equal efficiencies in E and F, but, if that were so, why run at 160 revolutions with the heavy gear involved when 200 revolutions would give equally good results? He did not consider Mr. Dornan correct in this statement, as not only was the propeller efficiency improved by the reduction of revolutions, but the manœuvring capabilities of the vessel benefited from the larger propeller discs which became possible. Referring to Mr. Dornan's remarks on the effect of superheated steam on reversing turbines, he was aware

of the difficulties of admitting superheated steam to an astern turbine which might have been working at a comparatively low temperature, but there were ways of overcoming these difficulties, such as adopting astern turbines of the impulse type.

Mr. Roland S. Portham referred to the able manner in which Mr. Dornan had put forward the several alternative designs for an intermediate Atlantic liner. The figures, he said, were particularly interesting as they dealt with some practical examples. Design A, he understood, represented the actual figures furnished by the superintendent of a well-known steamship company, and design B represented the trial figures of one of the most recent turbo direct-driven Atlantic liners. The performances of the other designs appeared to him to be based on sound and well-established data. It would be noticed that designs C, D, E, F and G had a strong family resemblance in the fact that they all adopted superheated steam. The Continent had adopted superheat in reciprocating engines in marine practice on a larger scale than this country, though British owners were now installing the system on a rapidly increasing scale. Bearing directly on the question of superheat for an Atlantic liner, it was interesting to note that the North German Lloyd Company had decided on high superheat for two of their latest Atlantic liners, the *Columbus* and her sister ship. These vessels were each of 35,000 tons displacement, with two four-crank triple-expansion engines, of 15,000 i.h.p., driving twin-screws, the cylindrical boilers being fitted with smoke-tube superheaters. He was informed that the guaranteed coal performance (14,000 British thermal units) for engines and propelling auxiliaries was 1·05 lb. per i.h.p. per hour, and 1·20 lb. per i.h.p. per hour for all purposes, which confirmed Mr. Dornan's figure of 1·257, design C, for a similar type of ship. The auxiliaries in this ship were to be supplied with saturated steam. The *Columbus* had four-crank triple, instead of quadruple-expansion engines, owing to experience having shown that, the higher temperature and drier steam in the third cylinder was slightly advantageous as compared with the increased number of expansions in the quadruple design with the same total temperature in the high pressure receiver.

U.S. Coal Labour Troubles.

Serious trouble, according to *Shipping Illustrated*, is brewing in the coal fields. In April, for the first time in six years, the working agreement between both anthracite and bituminous operators and miners will expire simultaneously. It is the general belief that unless some method be found for settling the disputes now assuming definite and threatening form, a strike will develop next April, At the present time the labour unions are in excellent condition. both financially and numerically. Their general and local treasuries are full to overflowing, their ranks are filled up and there is no danger of complications arising through the competition of non-union foreign labour. The drain on the labour supply occasioned by the war in Europe, and the closing of the source of this supply by the same cause, have made the percentage of union members in the coal fields unprecedentedly high. The attitude of the United Mine Workers of America over a number of years makes it possible to forecast the demands of the miners and the methods adopted to force their acceptance. The tri-district convention of the United Mine Workers recently held in Wilkes-Barre, Pa., hinted that the demands of the anthracite workers would be recognition of the union, an eight-hour day, a 20 per cent. increase in wages and a "more speedy, simplified and satisfactory method of settling disputes," this latter probably meaning a union tribunal empowered to make settlements. Of greatest significance, however, is the expected demand for a two-year instead of a four-year agreement. In order to avoid trouble the United States Department of Labour has studied the question in detail and has made tentative recommendations to the President. The belief is held among some of the operators that the spirit of European syndicalism is strong among members of United Mine Workers of America. The object of this element in the miners' union is to control the mines and operate upon a co-operative basis. To do this, it is pointed out, the mine owners must be placed in a position where the operation of the mines is no longer profitable.

THE UTILITY OF THE WILLIAM FROUDE TANK.

The discussion at the meeting of the North-East Coast Institution of Engineers and Shipbuilders at Newcastle on the paper on "Model Experiments," read at the previous meeting by Mr. G. S. Baker, Superintendent of the William Froude National Tank, was resumed on Friday evening. The earlier proceedings were dealt with in our issue of December 2, page 492.

Sir Archibald Denny said his remarks would be more in the nature of a corroboration of Mr. Baker's work and suggestions than of criticism. He gave a short description of the tank which his firm established 33 years ago, and stated that he believed that it was the second such tank to be established in this country, the first being built by the late Dr. Froude at Torquay. In 33 years, as they could well imagine, they had built and run an enormous number of models, and had arrived at a stage when they could generally predict with great accuracy what the results would be. They had been conducting an elaborate series of experiments, but the pressure of work for actual vessels to be constructed was so great that they had never completed the series. As far as they had gone, however, they were greatly assisted in their general conclusions. Now they were devoting most of their time to model propeller calculations. The field there had been hardly touched. It was so great that there was room for any number of investigators, and the more the better. Their tank was used for commercial purposes mainly, and the speed of turning out results was of great importance. Many conclusions to which his firm had come from the use of the tank were in line with those of Mr. Baker. As to the instability of results at low speeds, their experience tallied with that of Mr. Baker. If they were obliged to investigate the lower end of ship resistance and run into the stability limit, they increased the size of their models at these low speeds. Why that instability occurred he was not able to explain. It might have something to do with surface tension. With regard to the question of scaling up of frictional resistances, they had a suspicion in the early days that applying Froude's curves caused an over-estimate. Recent experience with actual vessels, however, had led them to be less suspicious, and there was this to be said for it—that their combined experiments with ship models and propellers and reduced shaft horse-power from the models scaled up, and the actual horse-power was unity or near unity. Up till now, they had stuck to Dr. Froude's curves and did not follow Mr. R. E. Froude in 1888, because they knew that, as the vessels they were dealing with from day to day were not violently different from one another, the only effect would be a change in propulsive efficiencies. He shared Mr. Baker's hope that an experiment would be made from the verification of the elaborate and interesting work which Mr. Baker had done.

Taking the three sets of figures available, he calculated that in the *Greyhound*, a vessel 172 ft. long, the E.H.P. would be as follows for different speeds :—

	6 knots.	11·84 knots.
Froude	40·90	630·7
Denny	40·50	630·4
Baker	38·60	613·3

That was with the plain ship. When they came to the *Carmania*, a vessel 600 ft. long, they then got :—

	18 knots.	22 knots.
Baker	6,225	12,980
Denny	7,160	14,730

Of course, that was a very large alteration, and his firm had been accustomed to think of these figures in efficiency. He thought he was right in saying that they would not have been surprised, in a well-screwed ship, to get an efficiency, in a ship of that size, of 60 per cent. It was a question whether it would not be better to wait for the trial of the long surface. That was his feeling.

Speaking generally as to tank experiments, he said these were not so simple as might be thought. One had got to be very careful indeed in watching many conditions and in making corrections. They might take it, however, that, with well-conducted tanks, it

made no difference whatever which tank the models were tried in. The results were practically identical. That fact Mr. Baker and he had proved, each trying an identical model in his own way. The agreement was wonderfully close—he did not say surprisingly close, because neither Mr. Baker nor he expected anything else. The same model was tried in the Washington tank, on the other side of the Atlantic, and there again the results were identical, excepting he thought, at the lower speeds, where there was a slight difference which might have arisen from the different size of the model or the conditions of the water or some other slight difference. Care must be exercised as to the surface of the model. His firm used paraffin wax, but made it an absolute rule that the model must not be retried, after being 48 hours in the water, without being cleaned and polished. As Mr. Baker had stated, differences in the temperature of the water made the model tend to change form. The speed at which the model ran must be uniform. The late Dr. Froude and, for some years, Mr. R. E. Froude, used logs in front of the models. Neither Mr. Baker nor he did that. They ran the model up and down the tank at the same speed, and by that method got very good results. The labour of analysing and checking those log results and then not being sure they were right did not seem altogether satisfactory. When screw results were being ascertained, they required to have run after run at precisely the same speed, and that, also, was a thing his firm had got pretty well. The work Mr. Baker had done as to skin friction had been plotted in a most excellent manner. Mr. Baker had plotted it in such a way that one could use the results in water, air or any other fluid, and seemed justified in his conclusion that his method of plotting was borne out by actual occurrences.

When his firm came to strut and bilge keel resistance, their method of getting the information was to fit the struts and bossings and bilge keels, if they wanted to test them, on the model to scale, taking care by proper sharpening and shaping that they avoided any chance of eddy resistance. They found that the law of comparison held exactly. They were driving the ship and the appendages upon the water with the appendages attached as an integral part, and were not considering them as separate entities, as Mr. Baker had done. Their method gave them some very interesting results in screw experiments. Using the coefficients they had got by practice, they were able to predict with models what would be the actual speed and horse-power of the vessel with very considerable accuracy. They considered that they had got, by combining the projections with the model, a true conception and a true measure of the resistance of the action of the ship. The projections of which he spoke were bossings, not struts. They had tried struts in the same way, but not comparatively. As to bilge keels, the series of experiments they had made, coupled with their long experience with actual ships, led them to believe that bilge keels, as ordinarily fitted, increased the resistance in proportion to their surface. He would give them the results of a valuable experiment—valuable in the sense of having cost a lot of money—made with a full-sized vessel, a cross-Channel steamer. The superintendent has specified a very long bilge keel, so long that if the keel were put square to the bilge, it would have come out of the water. His firm, therefore, had to flatten the angle to keep the bilge keel down. When the bilge keel was fitted on the ship, they found that it had a very serious effect upon the resistance. When the vessel came to be tried, although she fulfilled her guaranteed speed, the speaker's firm were not satisfied with her efficiency. Finally, they had to cut off the whole of the bilge keel. There was then an appreciable improvement in her horse-power. In another instance they tried screw experiments, and found that what was wrong was an insufficiency of surface in the screws. That rectified, it was all right. Why had they not done that at first? Well, they had just completed another ship, of practically identical specification, which was quite successful. To that day he could not explain why one vessel required more surface for her propellers than the other.

In another case, they were building some paddle boats for India and were anxious to know whether they might assume that the paddle wheels would act in the water of the Indian river in the same way as that in which they would act in their own tank. Therefore, as a member of their staff was in India, they asked him to try, in a particular boat, boards—one 12 in. square and the other 24 in. by 6 in.—vertically and horizontally. The following were the comparative results:—

	Ship.	Model.
12 in. × 12 in. at 10 miles	217 lb.	219 lb.
24 in. × 6 in ,, ,, ,, (vertically) ...	247 ,,	259 ,,
,, ,, ,, ,, ,, (horizontally) ...	194 ,,	198 ,,

(To be continued.)

THE TIME-ELEMENT AND RELATED MATTERS IN SOME SHIP CALCULATIONS.*

In estimating the stability and trim of a vessel after specified damage, attention is generally confined to the results of calculations for the particular case where the total loss of buoyancy resulting from the damage has been compensated for by deeper immersion of the vessel; and on these results opinion is based as to whether the ship will be safe or not after such damage. But at some intermediate time before the calculated final condition is reached, it may happen that other conditions supervene, which render the conclusions drawn from that calculation invalid; and it becomes necessary therefore to study intermediate conditions through which the vessel passes to ensure that no factors will be introduced which will vitiate the final result.

One or two illustrations of this are given and some closely-related questions are briefly discussed. Floating bodies of regular form are taken for the sake of simplicity. In a box-shaped vessel 200 ft. long, 30 ft. wide, floating at 10 ft. draught, and having its centre of gravity 11·8 ft. above the keel, a central transverse compartment 50 ft. long (assumed empty) is open to the sea. Will this vessel be stable after damage and free from danger in still water, with a row of sidelights open, the lower edges of which are 15 ft. above the keel? The metacentric height of the undamaged vessel is ·7 ft. Calculation shows the sinkage due to flooding to be 3⅓ ft. and the final G.M. becomes ·5 ft. positive. It might be concluded from these calculations that the ship would be stable after damage and safe under the conditions assumed with ports open. But it is well known that in the early stages of the filling of such a compartment there will be a decided fall in the position of the virtual metacentre. In the early stages of filling there may be a considerable area of free-water surface, and the metacentre shortly after damage is distinctly lower than it was before. It is quite possible that at some intermediate stage of the filling-up process the metacentric height may become negative. This, indeed, is the case for the special vessel under examination. In the early stages the stability is negative, and the ship will evince a tendency to "loll," and if the hole through which the water enters is of comparatively small dimensions, there would be an appreciable time for the list to develop.

The magnitude of the angle of "loll" varies with the depth of the admitted water, and to calculate this angle as accurately as possible, cross curves of stability with water to different heights in compartment have been constructed. From these a curve can be made for any desired height of internal water, and the angles where the righting arm is zero, which give the required angles of "loll" can be ascertained. It is found that the angle of "loll" rapidly increases with inflow of water until a maximum angle of about 18 deg. is reached. From this point the angle rapidly diminishes with inflow of water and vanishes when the water becomes deeper in the vessel. The extent to which the side of vessel becomes immersed depends upon the depth of water admitted, which determines the draught of the ship and the angle of heel. With 4 ft. of water in the vessel the angle of heel is 17½ deg. and the draught of the immersed side is

* Abstract of a paper read by Professor J. J. Welch, M.Sc., M.Inst.C.E., Member of Council, at a meeting of the North-East Coast Institution of Engineers and Shipbuilders, Newcastle-on-Tyne, on December 17.

15·73 ft. The lower edges of the portholes are thus 9 in. below the water, and therefore the vessel would be unsafe under the conditions assumed.

If, instead of open ports, a bulkhead deck were fitted at the height indicated for these ports, and the damage to the compartment from collision were of moderate amount below water, whilst being of considerable amount above the bulkhead deck, the resulting list at an early stage would allow water to flow in above the bulkhead deck, so reducing the stability still more and probably causing the vessel to founder. This would not happen if the damage were wholly below the bulkhead deck, as water could then only flow to adjacent compartments from the damaged one over the tops of the bulkheads, and with only a few feet of water in the ship when listing occurs, such overflow is, of course, impossible. In this case the temporary condition of instability would have no untoward results if ports, &c., well above water were closed.

For calculation purposes the compartment has been assumed empty, which involves the greatest loss of stability. In practice the loss of inertia due to flooding would be less than that assumed, in the ratio which the permeability of the compartment bears to unity.

As it is probable that damage by collision would involve the parts both above and below the bulkhead deck, it becomes interesting to inquire what is the minimum metacentric height which can be adopted, so as to avoid danger from instability through flooding. Obviously the safe plan would be to have such a metacentric height as will ensure stability at all stages during the flooding of a compartment or compartments having the greatest permissible length under the rules of the Bulkhead Committee. This can often be done without prejudice to the other qualities of the ship. Cases may arise, however, when the metacentric height thus determined would militate against the desirable quality of steadiness at sea. To ensure no heel during the filling of a compartment having a permissible length = C times the length of the ship, the maximum metacentric height required is given by :—

$$\frac{1}{12} \cdot \frac{c}{b} \cdot \mu \cdot \frac{B^2}{D} \qquad (1)$$

where "b" is the block coefficient.

"μ" is the permeability of the compartment (assumed in the region of midships and of the full breadth of the vessel).

"B" is the breadth of the ship.

"D" is the draught of the ship.

This supposes that as soon as water enters the ship the free surface has a breadth equal to the full breadth of the vessel, an error on the safe side.

If a certain amount of heeling is allowable, the following tentative expression gives a reasonable deduction which can be made from the amount determined by (1), whilst ensuring that the bulkhead deck will be well above water throughout.

$$\text{Deduction} = \frac{1}{2 f^2}\left[\frac{4 F b}{a} + \frac{D}{C_1}\left(1 - \sqrt{1 + \frac{8 C_1 F b}{a D}}\right)\right]$$

where $f = \frac{b}{a}$.

a = coefficient of area of waterplane.

"F" = the freeboard to bulkhead deck,

"C_1" $= \frac{n - \frac{1}{12}}{b} c \mu$ where "n" is the moment given by :—

moment of inertia of load water plane about its middle line, divided by (length of water plane $\times B^3$).

Another case may be mentioned where the element of time has an influence on the final result. Suppose the box-shaped vessel to have two end compartments. In the event of the foremost compartment being bilged by collision, what would be the final draught and trim if, at the same time, the after compartment is also put in communication with the sea by opening a valve? If the openings in the two compartments happen to be of the same size and similarly situated it is evident that the ship will sink without change of trim, until the buoyancy lost through opening up the end compartments is made up by the intact portion of the vessel above the original waterline. If, however, the hole in the forward compartment was very large, that compartment would be filled almost instantaneously, whilst comparatively little water would enter aft through the relatively small valve opening. The vessel would quickly take up a position in which the water would be above the inner bulkhead of the foremost compartment, and would therefore overflow into adjacent compartments, with consequent foundering of the vessel. For moderate damage forward and with the valve aft simultaneously opened, the top of the bulkhead forward might not for any intermediate position of the vessel be brought below the waterline.

These principles have a bearing upon the question of providing flooding or pumping appliances to introduce water at one end of a vessel to correct trim due to damage at the other end with a view to improving the chances of safety of the vessel.

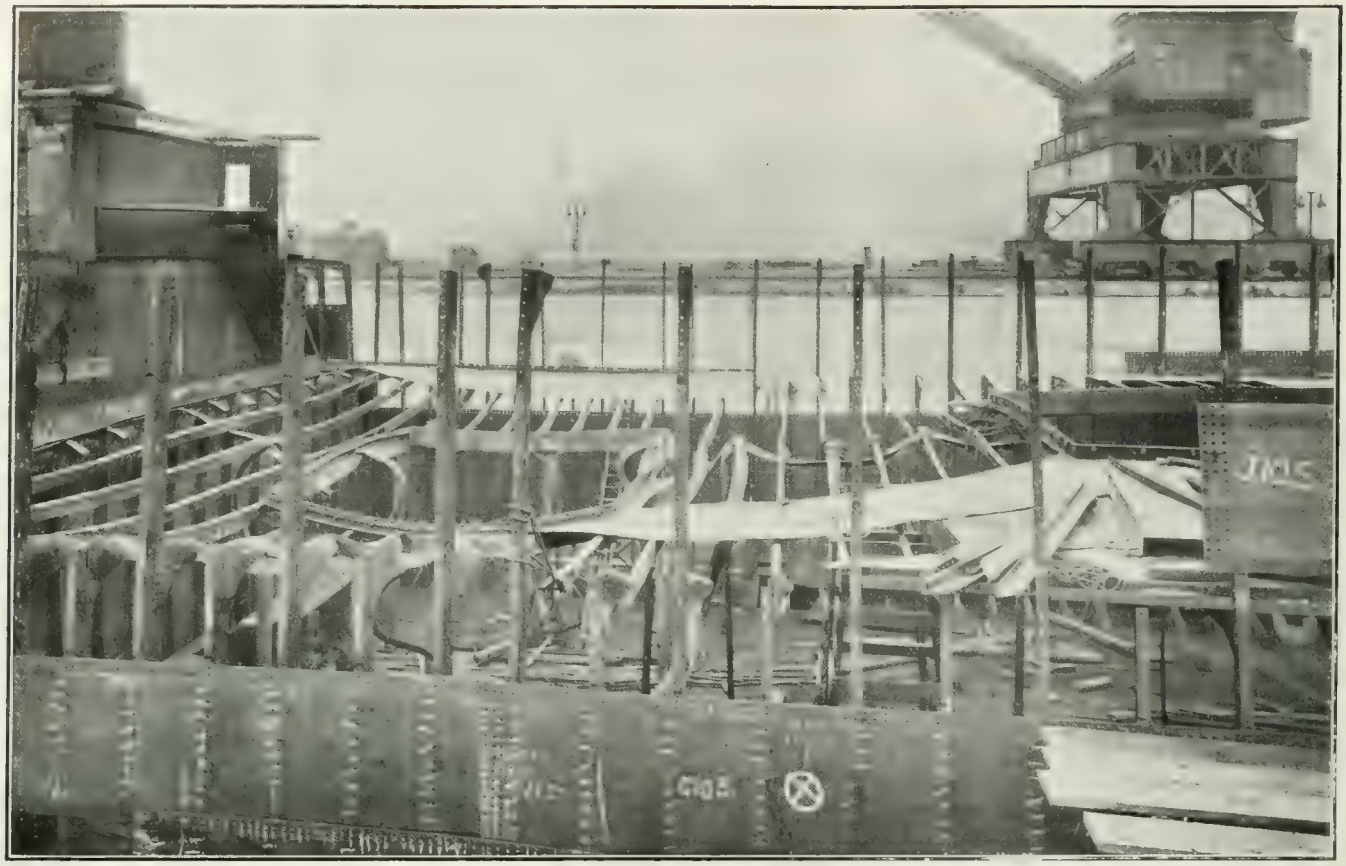
Discussion on the paper was opened on Friday evening. The President (Mr. Herbert Rowell) remarked that the question dealt with in the paper was one that lent itself to a great deal of investigation. He was sure that those who had to make calculations of stability and to consider questions of that nature had all felt that their usual methods of dealing with these matters was not as complete as it might be. Prof. Welch's contribution to the subject was very important.

Sir Archibald Denny stated that he wanted to put a consideration before Prof. Welch. Supposing that he had the vessel to which he had referred, with compartments forward and compartments aft, and supposing that he had a compartment of such length forward that, if holed, the vessel would sink and that there was a compartment aft of shorter length. If there were a reasonably small hole in the forward compartment and a large opening in the after compartment were opened, of course the water would flow in there and also forward. The speaker thought that what would happen would be that the vessel would sink all the same, unless the hole aft were closed. That was a matter on which Brunton Bros. had been working with models, but he had pointed out to them that they were rather "hazing" themselves, and that they should use a square model, as Prof. Welch suggested.

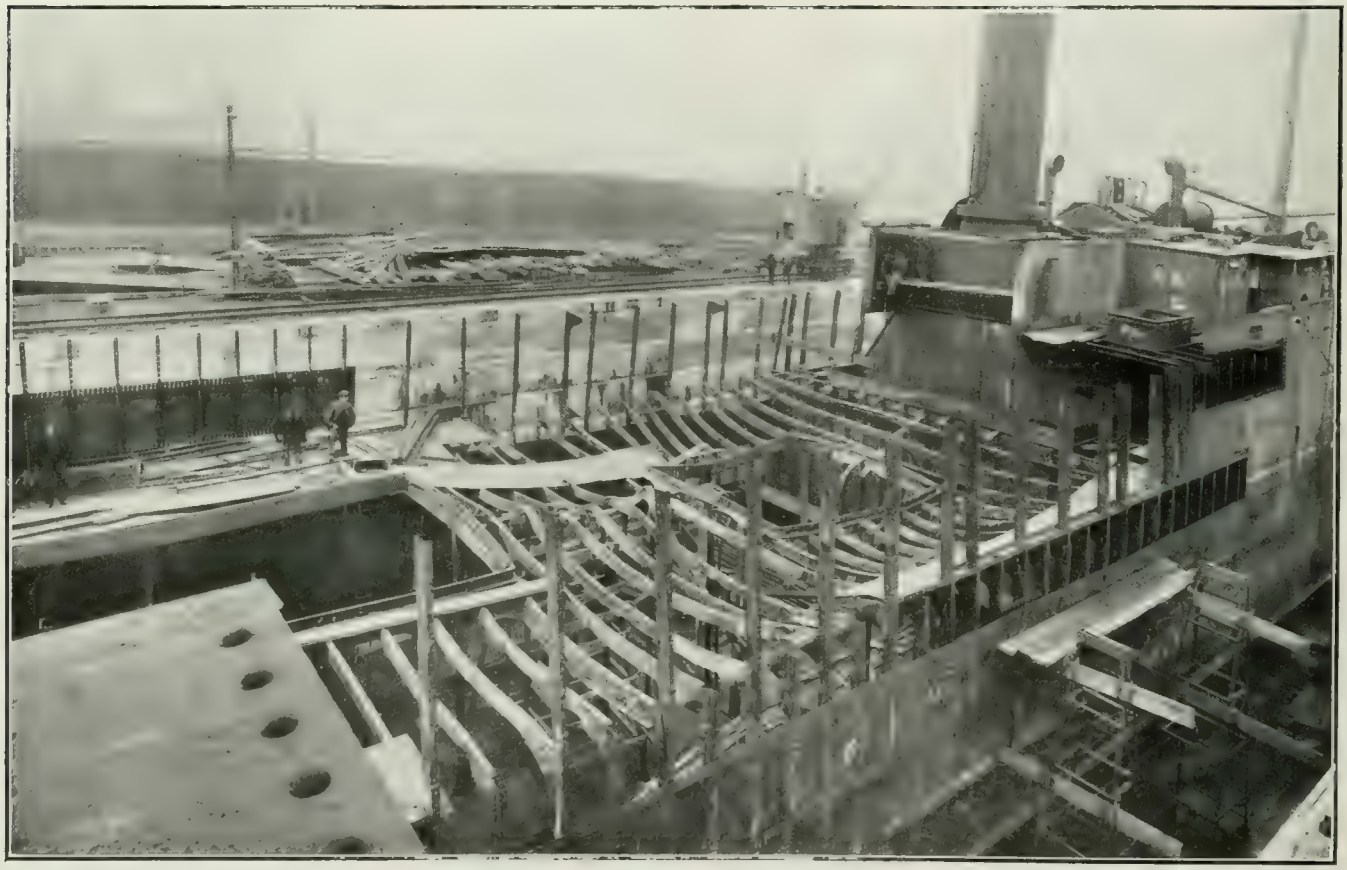
Further discussion was deferred until next meeting.

FIRE DAMAGE REPAIRS TO THE SS. "COLEMERE."

Whilst homeward bound from Port Sudan, laden with a full cargo, consisting principally of cotton-seed and gum, the steamship *Colemere* took fire in the Mediterranean in September last. She was put ashore at Bona, and then went into Algiers for temporary repairs preparatory to leaving for Bristol where such of the cargo as remained was discharged. The cotton-seed was almost entirely destroyed, but a portion of the gum was undamaged. The *Colemere* was subsequently taken to the Tyne for repairs and entered the No. 2 graving dock of Swan, Hunter & Wigham Richardson, Ltd., on October 13. The *Colemere* is owned by Herbert Watson & Co., of Manchester, the managing owners of the Watson Steamship Company. She is of about 4,000 tons d.w. and was built and engined in 1915, by Dunlop, Bremner & Co., Ltd., of Port Glasgow. The photographs on page 562 give an excellent idea of the nature and extent of the damage, which, it will be seen, was chiefly confined to the forward part of the ship, inclusive of the engine and boiler rooms. The shelter deck and fittings were totally destroyed, and the whole of the accommodation, except that on the port side, is being renewed. The work, which constitutes one of the largest repair contracts carried out during recent months, is expected, owing to the demands of Government work and the shortage of skilled labour, to take over three months in completion.



Fire Damage to SS. "Colemere." Starboard Side, Looking Aft.

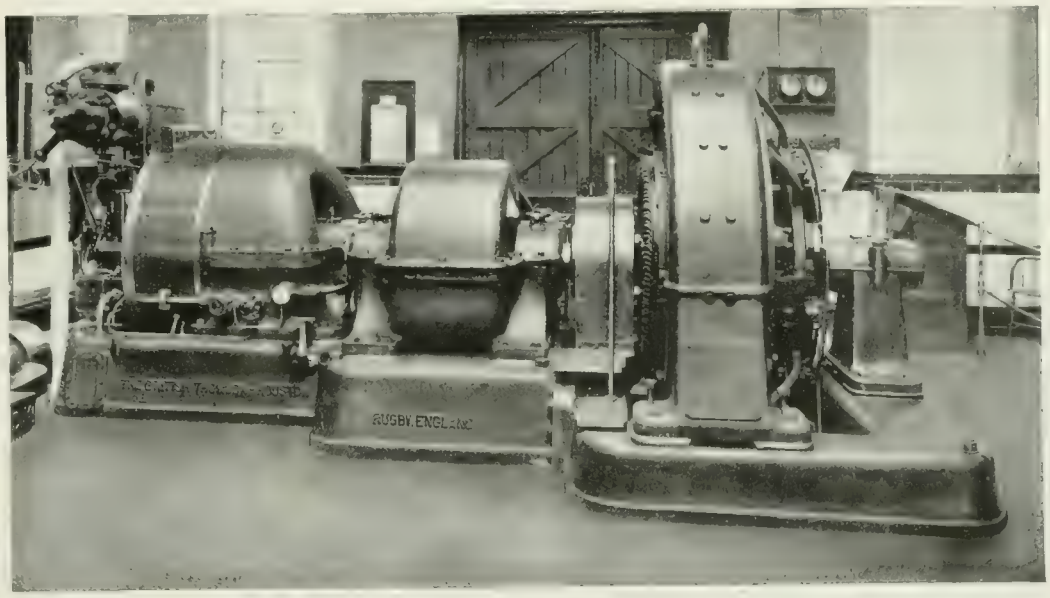


Fire Damage to SS. "Colemere." Port Side, Looking Aft. (*See page* 561.)

GEAR-DRIVEN CONTINUOUS CURRENT TURBO-GENERATOR SET.

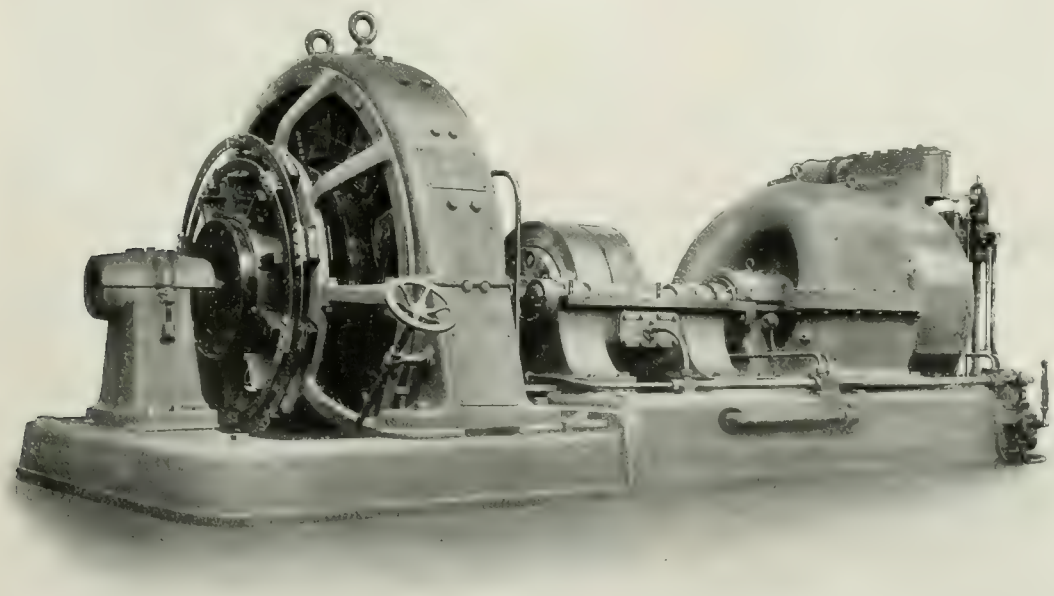
Recent developments in the science of gear cutting have attracted attention, chiefly on account of the introduction of high-speed gearing in the driving of ships, both mercantile and naval, whereby the lightness and economy of a high-speed turbine can be combined with the efficiency of a slow-speed propeller.

There is, however, another field which offers great possibilities for the use of gears in combination with turbines, viz., the driving of continuous-current generators. Certain mechanical and electrical difficulties, which will be touched on later, appear to be inseparable from the design of continuous-current machines of any considerable output running at any speed approaching that desirable for an efficient steam turbine, with the consequence that up to the present time continuous-current generators have either been given by reciprocating engines, or if turbine driven, have been subject to undeniable limitations in either speed or output, or both.



Gear-Driven Continuous Current Turbo-Generator Set in the Nuneaton Power House.

The direct-current generator is essentially a moderate speed machine and does not lend itself readily to construction for the high speeds of steam turbines. At the slow speeds of gas and oil engines, both direct and alternating-current generators become large and costly for their output, and a good efficiency can only be obtained by further adding to the cost. At the moderate speeds of so-called high-speed steam engines and motor generator sets conditions improve, and sound, high efficiency machines can be designed without difficulty.



View with Casing Removed showing Gearing.

In building continuous-current direct-coupled turbo-generator sets, mechanical difficulties arise in the construction of the commutator, in securing the armature windings, and in arranging that the running speed shall not be near the critical speed. Electrical difficulties arise on account of the high re-actance volts of the coils undergoing commutation and high volts per commutator segment. To ensure satisfactory operation a field structure with compensating windings is usually employed, and the consequent extra excitation losses, together with the rapid increase of core loss, friction and windage at high speeds, combine to reduce the efficiency considerably in spite of reduced armature copper and shunt field losses. The compensated field construction also considerably increases the cost and the time required to build a machine.

As typical commercial efficiencies for the three types of generators we may take 91 per cent. for a 250-kw. 440-volt slow-speed machine, 93·5 per cent. for a moderate speed machine of the same rating, and 89 per cent. for a generator running at steam turbine speed. The reduction gear would have an efficiency of about 98 per cent., which gives 91·6 per cent. as the combined efficiency of the generator and gear.

Geared turbo-generator sets can now be built for practically any output to compete in cost, efficiency, reliability and floor space with either turbo-alternator rotary equipments or reciprocating engine sets.

As indicated above, the gear-driven generator is built on normal lines, and therefore calls for little detailed description. Being designed to run at a fairly high speed, so as to keep the cost of gear

and generator at a minimum, all details of design require careful attention. The practice followed by the British Thomson-Houston Company to produce a sound, highly efficient, moderate-speed generator may be outlined as follows :—

Thin laminations of special steel are used for armature core and pole faces to reduce the core loss, as the frequency of the armature currents before commutation will be 40 to 50 cycles per sec. Armature clamping bolts which pass through the core are insulated to reduce eddy currents. The air gap is made longer than would be the case with a slow-speed machine, so that the distortion of the main flux caused by armature reaction is reduced.

The commutating poles are so designed that over the whole working range from no load to the guaranteed overload the commutating flux is practically proportional to the load on the machine. The commutating pole air gap is adjusted on test so that the reactance volts of the coils undergoing commutation are exactly neutralised. Diverters across the commutating pole windings are not used as, although they form a convenient method of test adjustment, the amount of current diverted is apt to vary on account of changes of resistances due to temperature and variation of the resistances of connections, which in the case of low-resistance windings may form an appreciable item. Also, on varying loads, a plain diverter will not take a uniform share of the current as its inductance is very much less than that of the winding. Inductive diverters are difficult to adjust and are not satisfactory.

Even when adjusted to operate perfectly up to heavy overloads, commutating machines are always liable to flash over on heavy short circuits. To minimise the risk of flashing over and to reduce the damage caused by a flash, the clearance between adjacent brush brackets should be kept a maximum, and the space between the commutator and the bearing should be kept free from bus rings or earthed metal parts as the flash always tends to spread outwards from the machine. The illustrations show that the British Thomson-Houston design of brush gear fulfils these requirements.

A substantial brush yoke supported from the magnet frame, brush springs designed to prevent brush chatter, and a carefully balanced armature eliminate the mechanical causes of unsatisfactory commutation. Graphite brushes reduce the commutator loss to a minimum and rapidly produce a hard polished skin on the commutator, the wear of which is very slight.

Equaliser rings fixed in an accessible position at the back of the armature prevent unbalanced magnetic pulls and equalise the distribution of the load between the several paths through the armature, which is of course parallel wound. The choice of a suitable speed and number of poles limits the volts per bar to a reasonable figure. The armature windings are secured against centrifugal force with an ample factor of safety by means of fibre wedges in the slot portion and steel wire binding bands on the ends.

A set recently installed by Mr. Cameron Gibson, the Borough Electrical Engineer, in the power station of the Nuneaton Corporation, is an interesting example of a gear-driven set. It consists of a British Thomson-Houston shunt-wound generator having a normal output of 1,500 amperes, at from 470 to 500 volts, driven through double helical gearing by a British Thomson-Houston Curtis turbine of 750 kw. normal capacity. The set has an overload capacity of 25 per cent. for 2 hours and 50 per cent. for 5 min. The complete set has been constructed by the British Thomson-Houston Company, and the turbine is of their standard three-stage design as used for driving alternators, and runs at 3,250 r.p.m., the gearing reducing the speed to 600 r.p.m. for the generator. The turbine drives the pinion shaft through a double claw coupling, which allows the pinions to take their correct axial position without any end thrust being transmitted to the turbine shaft. The armature spider is bolted direct to a large flanged coupling on the slow-speed shaft, the bearings of which consequently carry a portion of the armature weight.

The gears and bearings are completely enclosed and have a copious supply of oil from the main oil pressure system of the turbine, which also operates the servo-motor of the well-known British Thomson-Houston governor gear. A return pipe from the bottom of the gear case leads the oil back to the main oil tank, whence the oil pump on the turbine delivers it through an oil cooler back to the supply pipes.

This set was put on commercial load in January of this year, after exhaustive tests in the shops of the British Thomson-Houston Company had proved that guarantees were fully met, and the completely satisfactory manner in which the set has behaved since its installation has given all concerned perfect confidence in the future of this combination and resulted in an order being given to the British Thomson-Houston Company for a duplicate set.

The Finance Act and the Shipowners.

Mr. Donald Maclean, M.P., Deputy-Chairman of the House of Commons, attended a private meeting of the Executive Council of the Cardiff and Bristol Channel Shipowners' Association at the Cardiff Exchange on Friday and discussed with them the provisions in the Finance Act with special reference to the shipowning industry, and particularly the much-discussed and misunderstood par. 6 of Part II of the Fourth Schedule. This paragraph reads as follows :—

"It is hereby declared that where any business or trade is confined to the management of any particular assets, but the power exists to substitute other assets for those particular assets or any of them, such a substitution shall not be deemed for the purpose of Part III of this Act to constitute a change of ownership of the business; but where any such substitution has been carried out by the sale of assets and the purchase of other assets, the capital of the trade or business shall be taken to be increased or decreased, as the case may be, only by the amount of the difference between the price of the assets purchased and the price obtained for the assets sold, and the capital representing the assets purchased shall be estimated on the same basis for all the purposes of Part III of this Act."

Mr. Maclean said that there was no reason to fear that the Act taxed capital, so all transactions in the sale of ships and profit on the sale of ships, except where the purchase and sale of ships was the business of the taxpayer, for the present, at any rate, was free from taxation. The effect of the paragraph above quoted may be best explained by taking a concrete case. Assume that a single ship company owning a vessel in July, 1914, with a pre-war value of £15,000, sold in January, 1915, that vessel for £35,000 and immediately purchased another vessel for the same sum, the question arises as to whether this purchase of another vessel is a change of ownership of the business. If it were so, the taxpayer would be able to bring in as his percentage standard of allowance 6 per cent. on £35,000 instead of the pre-war profit standard on the capital of £15,000, and would, therefore, in all probability pay less tax on excess profits. The Act says that he shall not be able to bring in this higher and really fictitious percentage, with its consequential advantage, but must, notwithstanding the substitution of another vessel at the higher price, take the pre-war standard of capital represented by the first vessel in July, 1914. A company might also, under Clause 40 (3) where there has been a shrinkage in value, claim for obsolescence on the basis of the latest purchase of £35,000. This is prevented by the last part of the paragraph, which means that the capital shall be estimated on the pre-war value of £15,000, and not on the £35,000 paid for the substituted asset.

The intention of the Treasury may be summed up as follows :—

(1) To prevent the substitution of one vessel for another constituting a change of ownership of the business in order to take advantage of the favourable provisions of Part III of the Act and thereby securing the statutory profit percentage on the highest amount of capital.

(2) To provide that allowance for new capital shall be represented by the amount actually put in and not the amount which is got out of the inflated condition of the market. For instance, if a company bought the substituted vessel for £40,000, the capital for the purpose of the pre-war standard will be the original value of £15,000, plus an additional £5,000, making together £20,000 as the basis for calculation. Likewise in the event of a purchase at £30,000, the standard will be £15,000, less £5,000, making the pre-war basis £10,000 and the margin upon which the excess profits taxation will be payable correspondingly higher.

(3) To throw back any claim for depreciation or obsolescence on to the amount which the company had actually put into the assets as its pre-war value.

GENERAL NEWS SECTION.

PERSONAL.

Mr. Andrew King Hamilton, Marine Surveyor for many years at Cardiff to Lloyd's Register of Shipping, who died on October 11 last, aged 77 years, left estate of the gross value of £2,633 of which £2,585 was net personalty.

The death is announced of Mr. Fred. O. Smith, President and General Manager of the F. O. Smith Shipbuilding & Dry Dock Company, at the age of 53 years. Mr. Smith was President of the Board of Harbour Commissioners in Norfolk, U.S.A.

Mr. E. A. W. Wynne, of E. T. Agius & Co., Ltd., coal exporters, has been nominated as a vice-president of the Swansea Chamber of Commerce for 1916. As there are no other nominations, Mr. Wynne will be elected at the monthly meeting to be held in January next.

Mr. J. Hamilton Gibson, Engineering Manager of Cammell Laird & Co., Ltd., Birkenhead, has been appointed by the Board of Inventions and Research as a member of a Special Committee of the Board to consider the question of marine propellers. Other members include Rear-Admiral G. C. Goodwin, Mr. S. W. Barnaby, Professor H. C. Carpenter and Mr. S. S. Cook. The chairman is Sir Charles A. Parsons, K.C.B.

The wedding took place on December 16 at New Kilpatrick Parish Church of Major George E. MacColl, 8th (Service) Battalion Royal Irish Rifles, home on leave from the front, and Miss Margaret Wallace, daughter of Mr. Peter Wallace, shipbuilder, Bearsden, late of Troon and Ayr. The bridegroom is a son of Mr. Hector MacColl, of the firm of MacIlwaine & MacColl, marine engineers, Belfast, and returns to the front in a few days.

Mr. D. Rupert Phillips, a director of Franklin Thomas & Co. Ltd., coal exporters, Cardiff, has just taken up his duties as a lieutenant in the Army Service Corps. He received his commission on October 9 last but on business grounds was granted an extension of time, his firm having several important contracts with the French railways. He was entertained to a complimentary dinner by some of his docks friends and presented with a sword, on which were engraved the names of the donors.

On last Monday week the death took place suddenly in Glasgow of Captain Alexander Hart. He was a son of the late Mr. Peter Hart, Master Mariner, Helensburgh. Captain Hart served his apprenticeship in a sailing ship with Lyle's, of Greenock, and became skipper of various sailing boats, the *Cape Wrath* amongst others. Nearly 20 years ago he entered the service of Gardiner & Co., Glasgow, and latterly had command of the *Glenetive* which he had just brought from Calcutta and berthed at Dundee.

Mr. John Meade Falkner, who has been elected Chairman of Sir W. G. Armstrong, Whitworth & Co., Ltd., in succession to the late Sir Andrew Noble, is the son of the Rev. T. A. Falkner, of North Newton, Wilts, and was educated at Marlborough and Hertford College, Oxford. He was formerly private secretary to Sir Andrew Noble, and when, some 15 years ago the late baronet was incapacitated by a cycling accident, Mr. Falkner's abilities were tested to the full, and the result was that later a seat on the board of the company was offered him. Two years ago he was made vice-chairman.

The death has taken place at the age of 86 of Mr. John Williamson, a commercial and shipping magnate at the Port of Liverpool. The deceased gentleman was a brother of the late Mr. Stephen Williamson, M.P., of Balfour, Williamson & Co., and was senior partner in the firms of Williamson, Milligan & Co., Liverpool, and Milligan & Williamson, Buenos Ayres. He was also a member of the Mersey Docks and Harbour Board from 1878 to 1889, and a director of the Cunard Company from its formation in 1880 till his retirement in 1903. Mr. Williamson was besides associated with many shipping and insurance companies at the Mersey port.

Mr. Wm. Cocks, General Manager of the Cardiff Channel Dry Docks & Pontoon Company, Ltd., was on Thursday last married to Miss Ella Webb, of Brighton, at St. Clement Danes, London. Upon Mr. Cocks's departure from the works on the Wednesday the whole of the workmen and officials gave him a most enthusiastic send-off. Mr. and Mrs. Cocks were the recipients of many handsome and costly presents, among which were silver fruit and flower epergne and dishes from the chairman and directors of the Cardiff Channel Dry Docks & Pontoon Company, Ltd., a grand piano from the officials and staff, and a silver salver and tea and coffee service from the Bristol Channel Dry Dock Owners' and Ship Repairers' Association.

FROM OUR CORRESPONDENTS.

CLYDE AND DISTRICT.

(From Our Own Correspondent.)

Glasgow.

There has probably never been so few new vessels fitting out at Glasgow as at present, the number having been reduced to four. The latest steamer to be completed is the *Cumberland*, which ran trials at the end of last week. This steamer was built by William Hamilton & Co., Port Glasgow, for the Federal Line, for their New Zealand meat-carrying trade. She is of the shelter-deck type, and has accommodation for a number of passengers on the bridge deck. The holds and 'tween decks are insulated and a large refrigerating plant has been installed. The machinery, which was supplied by David Rowan & Co., Glasgow, consists of twin-screw geared turbines, and steam is generated in five single-ended boilers fitted with forced draught. On the trial trip the *Cumberland* attained a mean speed of 16 knots. During construction the vessel was under the supervision of Mr. Esplen of Esplen, Son & Swainston, London.

Of the four new vessels which still remain in the harbour fitting out, the largest is the 15,000-ton liner *Aotearoa*, which the Fairfield Company have built for the Union Steamship Company of New Zealand. As this vessel was launched so recently as July last she will not be ready for some time yet. In Harland & Wolff's basin at Govan is the large motor vessel *Montezuma*, which was built by the Ayrshire Dockyard Company for Elder, Dempster & Co., Liverpool. The machinery for this vessel is being supplied by the Burmeister & Wain Company, Glasgow. The screw steamer *Macedon*, a vessel of 4,360 tons, which was launched in August last by Wm. Hamilton, is also at Glasgow at present awaiting her machinery, the construction of which has been delayed by the war. The only other new vessel at Glasgow is the water-carrying steamer *Porto Grande*, which is at present being engined by McKie & Baxter, the hull having been built at Greenock by Geo. Brown & Co.

Reduced Revenues at Scottish Ports.

A number of the smaller ports on the East Coast of Scotland have been rather adversely affected as a result of the war, and in nearly all cases their revenues show a considerable falling-off during the past year. At Arbroath, for instance, the Harbour Trustees have suffered a loss of about £570 in their revenues as compared with the preceding year, while the excess of expenditure over revenue was £499. These deficits while not large, are nevertheless a serious handicap on the smaller port authorities. The Kirkcaldy harbour authorities are considering the question of increasing their dues on shipping and goods, and of making reductions in their staff and in expenditure generally, with a view to reducing the cost of upkeep.

At Wick the harbour improvements have been suspended for some time owing to the lack of funds. The Trustees, however, hope to obtain a grant of about £31,000 from the Development Commissioners in order that the work of completing the new harbour may be proceeded with.

Canteens at Glasgow Harbour.

The arrangements for the establishment of canteens for dock labourers at Glasgow harbour have proceeded smoothly up till the present week, but at a conference between representatives of the shipowners, the Dockers Union, and the Clyde Trustees held on Monday a sharp difference of opinion arose, and the negotiations reached a deadlock. The dockers maintain that if the canteens are to be of any advantage to the quay labourers there must be both whisky and beer on sale. The shipowners and stevedores who employ the dockers have taken up an attitude entirely opposed to the supply of alcoholic beverages, and the conference broke up without coming to a decision in the matter. It is understood that an appeal will be made by the parties concerned to the Central Control Board.

BELFAST SHIPBUILDING AND SHIPPING.

(From Our Own Correspondent.)

Belfast.

With the exception of the launch of a small handy-sized cargo steamer at Londonderry, which is always included in the Belfast District in Lloyd's Register shipbuilding returns, there is nothing new to report. This vessel has been built at the North of Ireland Shipbuilding Company's yard on the Foyle to the order of the Pelion Steamship Company, Ltd., Newcastle-on-Tyne, and will be a thoroughly up-to-date coal carrier. She is named the *Alto* and is of a type of which the Derry Company makes a speciality. Derry in common with other yards is feeling the scarcity of skilled labour. In the Belfast yards there is the usual activity and a couple of vessels which were urgently required were got away prior to the holidays.

The rumours and reports regarding the sale of the Holland-Amerika liner *Statendam* to the Cunard Company have created an interest here. The vessel was launched so far back as July 9, 1914, and is still in the port in the hands of the holders. The report credited the Cunard Company with buying the *Statendam* to replace the *Lusitania*, but as she will be over six knots slower such a transaction is very unlikely, speed being the great factor with big boats of the Cunard Company.

MERSEY SHIPPING AND SHIPBUILDING.

(From Our Own Correspondent.)

Liverpool.

The principal points in Sir Helenus R. Robertson's annual review of the Mersey Docks Estate at the last meeting of the Docks Board are that the port continues to play a prominent part in enabling the country to prosecute the war, that in regard to congestion, the delay in providing steamers with berths is now negligible, and that whilst maintaining the docks estate in the highest state of efficiency, the provision of new works had been retarded by the scarcity of labour and the difficulty of getting materials.

Sir Helenus's survey of the past year also shows that the ships' tonnage paying docks and harbour dues amounted to 18,980,000 tons —a decrease of only 105,000 tons as compared with the previous year, while the total revenue had actually increased by some £5,600. While this result may be regarded as very satisfactory indeed, Sir Helenus fears that it cannot be maintained during the current year, with so many ships taken from their regular services of trading.

The Board has entered into a contract for the building of a new lightship to take the place of one 40 years old removed during the war, and presumably this will have a light of nearly equal power to that recently provided at the Bar.

Shipowners on the whole are acting very cautiously in regard to the acceptance of goods for shipment, for while there is plenty on offer, the limited number of steamers or sailings make it very undesirable to book traffic far ahead. Business going through is therefore being restricted by many firms to the steamer on the berth or about to load.

The report is again current—this time by German wireless—that the Holland-Amerika Line has sold their new ship *Statendam* to the Cunard Line. The Cunard management, again seen on this matter, state that they have nothing to say regarding it.

Monday this week was the 85th anniversary of the Royal Mail contract being given to the Isle of Man Steam Packet Company, between this country and Douglas.

Alfred Holt & Co. have issued statutory notices renaming the vessels they recently acquired from the Indra Line. The *Indragheri* has been renamed *Eurylochus*; the *Indradeo*, *Eurypates*; the *Inverclyde*, *Eurymachus*; the *Indrawadi*, *Eurymedon*; the *Indrasamha*, *Eurydamos*; the *Indra*, *Euryades*; and the *Indrakuala* to *Eurypilus*.

The Liverpool Chamber of Commerce has been advised by the Port and Transit Executive Committee, London, that arrangements have now been made with the Custom House under which goods for shipment by vessels not requiring pre-entry will be free to be put on board ship on arrival at the docks, provided shipping notes duly filled up and signed by the shipper are sent down with the goods. Shipowners and shippers need to be notified that a special form, approved by the Custom House, is obtainable, and has been devised to avoid the hitherto serious delays in shipment.

The inability of the railway companies to handle expeditiously the inward traffic intended for Manchester, has caused the lightering companies to announce an increase in their water carriage rates between the two ports, as from January 1 next. The lightering rates between Liverpool and Manchester will now, generally speaking, exceed the railway charges.

SOUTH WALES NOTES.

(From Our Own Correspondent.)

Cardiff.

At the monthly meeting of the Swansea Chamber of Commerce on Friday last Mr. T. P. Cook stated that a communication had been sent to the Board of Trade protesting against hasty legislation on the subject of pooling railway trucks before the traders of the country had time to consider the proposals. It would be imprudent at the present time to bring about this new scheme or burden any department with such heavy additional work. Mr. C. Cleeves said there was reason to believe that the Board of Trade had almost concluded a scheme, but, owing to the intervention of traders, it was not likely to be introduced this session. Mr. Sails pointed out that under all circumstances coal wagons sent away from South Wales would have to come back empty and that collieries were not stopped for the want of wagons, but because the wagons were tied-up filled with coal waiting for discharge. The scheme would act unfairly on certain collieries, and would be a serious thing for the interests of the country.

Welsh Coal Conciliation Board.

At a meeting of the Conciliation Board for the coal trade of Monmouthshire and South Wales on Friday last it was announced that both Earl St. Aldwyn, the independent chairman of the Board, and Mr. W. Gascoyne Dalziel, the secretary of the Coalowners' section of the Board, had resigned their positions. His Lordship, who had expressed a desire to retire last year, had at the request of the Board agreed to continue to act until the new coalfield agreement of 1915 came into force, but as the new agreement did not fix an equivalent average selling-price to the wage minimum percentage, the work of the independent chairman was materially increased, and Earl St. Aldwyn felt he could not undertake the task. A meeting of the Board has been fixed for appointing a successor to Earl St. Aldwyn. Mr. Finlay A. Gibson was appointed to succeed Mr. W. Gascoyne Dalziel as the Coalowners' secretary.

AUSTRALIAN NOTES.

(From Our Own Correspondent.)

Melbourne.

The Australian growers and shippers of wheat continue to take a sceptical, and in some cases rather hostile, view of the arrangements under which the Federal and State Governments in combination are making themselves responsible for the supply of tonnage for the 1915-16 wheat season, to the enforced exclusion of all private charterers. No official authority and no one in the local export trade appears as yet to be able to estimate the main effect from a business point of view of this novel scheme of socialistic State intervention—the conception chiefly of the Prime Minister of the Commonwealth, and one of whose hobbies consists in denunciation of what he calls the "shipping ring." Only two points so far are fairly clear: that the amount of tonnage obtainable in the manner prescribed is likely to be far below Australian requirements

in the early part of 1916; and that owing to the rigidity of the terms upon which the space is to be made available leaving no chance for the play of individual expert knowledge and experience —wheat shippers will operate with much caution, and show little of that speculative energy which has so often proved of advantage to the wheat producers in past years. It is stated by leading authorities in the Australian shipping trade that the space for 300,000 tons of grain and flour chartered for December and January (at 85s. per ton for the United Kingdom cargoes) represents no more than one-tenth of the total that will be required for the shipment of the present season's record crop. Apparently the export will have to be spread over the greater part of 1916. The wheat shippers, rightly or wrongly, think they could have handled the surplus much better without government aid, and certainly they assert, without injury to the producer, with whom they have always worked very amicably. There have been some strong expressions of doubt whether the Federal Government—which means Mr. Hughes—has any constitutional right to say that "no vessel except those chartered through Elder, Smith & Co. and Gibbs, Bright & Co. will be given clearance from Australia."

THE FREIGHT MARKETS.

(From Our Own Correspondents.)

London.

During the last two or three days a distinct holiday feeling has been in evidence in the freight markets. Still, having regard to the diminished supply of tonnage a fair volume of business has been put through. From the Northern Range a fair inquiry for tonnage has been in evidence, and rates show no alteration for the United Kingdom. To the Mediterranean and to French Atlantic and Spanish ports, however, fairly high figures rule. In the Plate section steadiness prevails. The *Lily*, 4,200 tons, 10 per cent., has been taken up at 112s. 6d. from San Lorenzo to the United Kingdom, spot loading. Up-river to United Kingdom, for January, 120s. has been paid to the *Don Arturo*. Another vessel, the *Fairport*, has been fixed at 117s. 6d., San Lorenzo to United Kingdom, February 16–March 16. From the Northern Range, the *Freja* has been fixed to French Atlantic ports, with oats, at 13s. 3d., January. In the Eastern section there is a pronouncedly firm tone. The *Bland Hall* has been chartered at the very high rate of 142s. 6d. to Marseilles, net terms, February 15 cancelling. Another vessel, the *Nora*, 6,000 tons, has been chartered for kernels at 140s., March 25 cancelling. From Kohsichang, the *Corinthic*, 7,000 tons, gets 130s. to the United Kingdom, February cancelling. In the outward coal market from the Tyne it is pretty clear that coal freights have begun to fall. The Mediterranean market, it is true, still retains its firmness, but in the nearer trades there has been no doubt about the decline in rates. At the beginning of this week, 30s. to 31s. offered for St. Nazaire-Bordeaux. Rouen could be done at 22s. and Havre at 20s. Representative fixtures include :—Dunkirk, 22s. (2,000 tons); Oporto, 37s. 6d. (1,000 tons); Barcelona, 47s. 6d. (2,000 tons). A slightly quieter tone is reported from Cardiff. Fixtures recently done include :—St. Nazaire, 38 fr.; River Plate, 39s.; Lisbon, 31s.; Marseilles, 75 fr. Newport to Rouen has been closed at 22s. 6d. to the *Ringholm*. Swansea to Dunkirk has been paid 23s. 6d. to the *Pluton*. From Hull to Rouen, 25s. has been paid to the *Norne*.

Glasgow.

The scarcity of tonnage has greatly restricted business of all kinds on the Glasgow market. In the homeward trade rates were firm all round, but as few steamers were available chartering was confined for most part to prompt positions. The River Plate was round about 117s. 6d. to 120s. America was quiet with little doing to United Kingdom ports. A fixture to French Atlantic ports was reported at 16s. 3d. Time chartering was again in evidence, the rates ranging from 23s. for short periods, 21s. for 12 months to 18s. for two years. In the East Burmah has perhaps been the leading market, and transactions have taken place from that quarter at about 125s., rice, to London or Liverpool. Australia secured some tonnage at 95s., wheat, to the United Kingdom. In the outward coal trade from Scottish and other ports business reached a standstill towards the end of last week owing to further supplies of coal for this month's export being unobtainable, and during the week the position locally was entirely governed by the scarcity of coal. Owing to the difficulty of stemming, rates in some cases were barely maintained. The following fixtures were reported :—Glasgow to Bayonne, 1,200 tons, 47 fr.; and Cardiff to River Plate, 4,500, 38s. 6d. prompt.

Newcastle-on-Tyne.

A moderate amount of business has been transacted on the outward freight market during the week but the general situation of the market is very unsettled and rates, consequently, irregular. Loading turns are exceptionally full and business has been very difficult to transact for the nearer destinations. There has been an absolute absence of business coastwise but quotations rule about steady. A very considerable number of steamers has been despatched to Rouen but the other ports of North France are neglected and rates for this quarter are down all round. Caen is 1s. reduced and Rouen from 1s. to 2s. lower. The prevailing rate for the latter port is now 23s. The Bay is an extremely dull market and the tone remains weak, Bordeaux having been done at 33s. 6d. The Mediterranean, on the contrary, still shows remarkable strength and advanced prices have had to be conceded for France and Italy. Genoa has been heavily booked at from 64s. to 67s.; an increase of from 1s. 6d. to 2s., whilst Porto Ferrajo at 62s. 6d. is 2s. 6d. up. Trondhjem has been fixed for at 19s. and Copenhagen at 19 kr. for small boats. Fixtures arranged since last report include the following :—Bagnoli, 3,000 and 4,000, 65s., option Porto Ferrajo, 62s. 6d.; Bordeaux, 33s. 6d.; Barcelona, 2,200, 50s.; 2,000, 47s. 6d.; Caen, 900, 24s.; Calais, 1,800, 24s.; Cadiz, 1,500, 40s.; Copenhagen, 1,600, 19 kr.; Dieppe, 2,000, 24s.; Gibraltar, 2,000, 34s. 6d.; Genoa, 2,800, 64s.; 6,000, 65s.; 3,000, 66s. 6d.; 4,500, 66s. 3d.; 2,000, 67s.; Las Palmas, 1,500, 36s. 3d.; Malaga, 2,000, 40s.; Oporto, 1,000, 37s. 6d.; Port Mahon, 1,000, 50s.; Palma, 2,000, 45s.; Rouen, 1,600, 25s. 6d.; 800, 26s.; 1,500, 24s.; 600, 33s. 6d., coke; 1,350, 23s.; River Plate, 2,200, 43s.; Trondhjem, 1,200, 19s.; Valencia, 1,000, 40s.

Liverpool.

Freights on this market maintain their firm character under the influence of a sustained demand for boats which cannot be adequately met, and experts hold to the view that the New Year will bring no relief to charterers. There is scarcely an outward or homeward market that is not firm, and at the same time bare of free tonnage. Outward engagements from here are few, but what fixtures there are, are at firm rates. Garston to Belfast has paid 9s. 3d.; Birkenhead to Bordeaux, 35s. (flour) and Liverpool to Alexandria, 67s. 6d. Time charter tonnage is still in good demand, and rates are appreciating. For a transatlantic round, 30s. d.w. has been paid, and still higher rates are probable. With regard to homeward business, River Plate has indications of more activity and even higher rates, for with good crop prospects, there is little or no free tonnage either for prompt or forward fixing. Representative values are around 118s. 9d. for prompt, 120s. for January-February, and 115s. for February-March, San Lorenzo to United Kingdom, North America quiet for grain at 16s. from Northern States to French Atlantic, and 18s. 6d. to Marseilles with 20s. 6d. indicated to West Italy. Gulf paid 22s. 6d. to Barcelona, and coals from Virginia are worth 55s. to River Plate and 90s. to West Italy. Eastern markets are very firm, and rising, rice notably so. Burmah to United Kingdom quotes 130s., following upon a fixture at 127s. 6d., for February, Bombay to Dunkirk having been fixed at 95s. now quotes 97s. 6d. to United Kingdom and a 100s. rate is not improbable. Calcutta indicates 125s. to 127s. 6d., and Karachi 85s., both to United Kingdom. Rangoon to Liverpool has paid 125s., January. Mediterranean homewards, needs tonnage at firm rates, and Alexandria to Liverpool done at 37s. 6d. Nitrate ports having fixed at 120s. is now quotably higher on scarcity of boats though there may be some easement if reports are true of the near opening of the Panama Canal. Sail tonnage quiet outwards, but homewards active and firm. Record rates are being paid on scarcity of ships.

Cardiff and Swansea.

Stemming difficulties have retarded chartering operations during the past week and rates have displayed an easier tone for the Bay and Coast ports, owners being anxious to get their boats away before the holidays, but for the Mediterranean and River Plate they maintained a steady tone. Tonnage to carry 162,850 tons was fixed to load at Cardiff (including Newport) or 21,000 tons less than in the previous week. Mediterranean business was comparatively slow, but with quoted orders urgent rates were upheld, tonnage being in none too plentiful supply, Algiers fixing at 65 fr.; Arzew or Mostaganem, 68 fr.; Alexandria, 72s. 6d. (800 tons delivery—a new high record) and 72s. 6d. (700 tons delivery); Genoa with options 65s. (twice)—a new record; Huelva, 32s.; Lisbon, 32s. 6d. (400

tons delivery—a new record), 32s. 6d. (450 tons and 500 tons delivery), 32s. (400 tons delivery—twice), 31s. (500 tons delivery); 30s. and 30s. 6d. (500 tons delivery); Marseilles, 73 and 75 fr.; Malaga, 35s.; Malta, 55s.; Naples, 58s. 9d. (1,000 tons delivery), 58s. (800, tons delivery) and 57s. 6d. (1,000 tons delivery—twice) and Porto Ferrajo, 60s. (800 tons delivery). Bay and coasting chartering was quiet and with stemming difficult rates were on the easy side, Bordeaux fixing at 44½ fr., 44 fr. (three), 42 fr. (twice), 43·12½ fr., 43 fr. (twice) and 42½ fr.; Havre or Havre Canal, 22s.; Rouen, 22s. 6d. (seven) and 22s. (twice), and St. Nazaire, 40 fr. (twice) and 38 fr. (twice). Rates for South America ruled steady on the basis of Bahia Blanca, 39s. 6d.; Monte Video, 38s.; River Plate, 38s. 6d. and 39s.; Rio de Janeiro, 42s. and Buenos Ayres or La Plata, 40s. Chartering from Swansea was comparatively fairly brisk, 35,980 tons being fixed, or 24,180 tons more than in the preceding week, which by the way was a very quiet period. Rates ruled steady for the Mediterranean on the basis of Marseilles, 78 fr. (a new record) and Genoa with options 65s., while Bay and Coasting rates were slightly easier, Bordeaux fixing at 45 fr.; Caen, 22s. 6d. (three); Honfleur, 22s. 6d. (a new record—twice); Rouen, 22s. 6d. and 23s. (twice) and 22s., and St. Malo 19s. (twice).

Hull.

The tone of the market remains firm for the Mediterranean direction especially for West Italy and there is a good measure of inquiry with rates based on 65s. for Genoa or Savona from Hull or Immingham and 65s. 6d. to 70s. for Alexandria from Hull or Immingham. A change has occurred in the conditions governing the coasting branch owing to the War Trade Department now beginning to refuse numerous applications by exporters for the special licences required to export cargoes of coal to the North French ports. This has caused rates to drop down from 26s. 6d. for Rouen from Hull to 20s. for Rouen from Hull and the rates to other North French ports are also much weaker. In local chartering circles the refusal of licences for French ports is attributed to a desire on the part of the Government to place more coal at the disposal of the inland armament works.

COMPANY REPORTS AND DIVIDENDS.

Nikolaieff Factories & Shipbuilding Yards.—The proposed dividend of 6 per cent. for the second (1914–15) working year has been confirmed.

Russian Shipbuilding Company.—The proposed dividend of 6 roubles 50 copecks per 100-rouble share for the fourth (1914–15) working year has been confirmed.

Russian Steamship and Trading Company.—This concern, with a capital of 10,000,000 roubles, made a profit of 1,767,063 roubles in its 59th (1914) working year, and will distribute 400,000 roubles in dividends.

Western Counties Shipping Company, Ltd.—The managers, Edwards Heppburn & Co., Cardiff, have declared their first interim dividend for the year 1915-16 of 1s. 4d. per fully-paid £1 share, free of income tax. This distribution is in respect of four months' trading, and is thus at the rate of 20 per cent. per annum.

Town Line (London), Ltd.—Harrison, Sons & Co., Cardiff, the managers, have declared the second interim dividend for the year ending June 30, 1916, of 5s. per £5 share. This is the sixth dividend of 5s. per share paid during 1915. The company have purchased the steamship *Bellvue*, 4,419 tons gross register, built at South Shields in 1908 (formerly named *Harford*), from Bell Bros., of Glasgow, for about £100,000. Another steamer has been purchased for delivery this month.

"Shell" Transport and Trading Company, Ltd.—The directors, in announcing the distribution of an interim dividend of 10 per cent., free of tax, payable January 5 (thus combining the interim dividends hitherto paid in the previous July and January), state that they have every reason to anticipate, when the completed accounts for 1915 are presented, that the results realised will not be inferior to those of the previous year. Owing very largely to the extension of areas operated by the company in various parts of the world, the prospects continue to be satisfactory.

Deutsche Levante Linie (Hamburg).—Just as last year, this company announces that special conditions due to the war make it impossible to draw up a balance-sheet. "Such ships (not specified) as remain at its disposal have been employed as far as possible in neutral waters, and the results obtained make a comparatively satisfactory picture were it not for the uncertainty to which the ships are exposed by piracy." It is asserted that high freights guarantee profitable working after the conclusion of peace, and the interesting statement is made that agreements have already been *proposed* (the italics are ours) for the conveyance of cargo at high freights after the conclusion of peace.

Stettin Oderwerke A.G. f. Schiff u. Maschinenbau.—The complete report of this company for the year ending June 30 last, shows £10,950 net profit, *i.e.*, almost exactly the same as in the previous year. This was distributed: £500 to repayment; £1,800 profit share, &c.; £4,240 as 5 per cent. dividend; £2,450 to special reserve, and £1,950 carried forward. Depreciation on buildings, floating dock and machine equipment is entered as £6,240 (£7,080 last year). Assets: Site, £61,000; buildings £23,100 (£22,700); slips, runways &c., £2,900 (£3,200); floating dock, £3,430 (£3,800); tools &c., £23,600 (£25,200); work in hand, £85,500 (£36,900); stock, £19,600 (£15,800); cash, bills, &c., £64,900 (£73,500). Liabilities: £85,000 share capital; £44,000 interest bearing bonds; £43,500 repayments; payments on new constructions and special debts, £128,000 (£91,400).

G. Seebeck A.G. Schiffswerft, Trockendocks, &c. (Geestemunde).—As already announced, this company is paying 8 per cent. (nil last year) dividend. After allowing £17,300 (£16,200) depreciation there remains £17,900 (£10,400) net profit, plus £10,400 brought forward from 1913–14. After paying 8 per cent. on the preference shares, paying directors fees and contributing to the workmen's fund, there remains £12,000 carried forward. Plenty of orders are in hand for the current year. At the wish of the holders, the 258 original shares in the company are being reduced to preference shares in the ratio of three for one preference share. The gross profit including amount brought forward is £58,000 (£38,000); maintenance charges, £7,650 (£6,300); depreciation, £17,200 (£16,300); loan interest, £4,850 (£4,900). The balance sheet shows: Raw materials, £34,200 (£20,600); tools, &c., £11,300 (£11,200); work in hand, £288,000 (£88,000); debtors, £39,800 (£43,200); surety debtors, £27,600 (£24,000); creditors, £325,000 (£140,000).

Orient Steam Navigation Company, Ltd.—The report of the managers for the year ending June 30 states that the revenue account, after providing for depreciation, shows a credit balance of £270,619, out of which a dividend of 5 per cent. on the preferred shares has to be paid. The managers recommend that a dividend of 5 per cent. be paid upon the deferred shares, that £57,910 be applied as mentioned under the next heading, that £50,000 be transferred to repair and renewal account, and £50,000 to general reserve account, and that the balance of £96,742 be carried forward to next year's account. In order further to strengthen the Orient Underwriting Fund, Ltd., it is proposed to increase its capital, subject to obtaining the consent of the Treasury, by the issue of additional shares to be allotted to deferred shareholders of the Orient Company. The issue will involve a call of £57,910, and to facilitate the subscription a distribution of this amount is recommended to the deferred shareholders. During the year £19,350 has been redeemed in anticipation of the requirements of the Trust Deed. Of the company's fleet, the *Ophir* has been purchased by the Government, four of their most modern vessels have been, and still are, on service as armed merchant cruisers, while the remaining vessels have maintained a mail communication with Australia and have served as transports.

Fried. Krupp A.G., Essen.—In a supplement appended to this firm's report for the year ending June 30 last, it is said that 27,000 of the staff and workmen have been called to the Colours and over 1,000 of these have received the Iron Cross—an interesting sidelight on the lavishness with which this trinket is distributed. The working surplus is more than twice as great as in the previous year viz., £5,510,000 as against £2,650,000. To this there is added £153,000 (£112,000) net interest receipts and £122,000 (£100,000) miscellaneous receipts. The disbursements include: Taxes, £522,000 (£482,000); workmen's insurance, £284,000 (£280,000); welfare expenditure and war allowances, £778,000 (£433,000). The net profit thus amounts to £4,230,000 (£1,655,000) to which must be added £459,000 (£340,000) brought forward. Due to increased military and naval demands, the deliveries to German account were about 2½ times as great as the home and foreign business combined in the previous year. Great extensions have been necessary: the cost of these will fall chiefly on the 1915-16 accounts and the outstanding half of the capital increase decided upon last year (£1,720,000) is to be called up. After allocating £1,860,000 to reserve funds and for various special allowances and workmen's

dwellings and pensions, there remains £2,310,000 from which a dividend of 24 per cent. could be paid. Actually, however, the dividend paid is 12 per cent. (as last year), £1,000,000 being taken from the surplus to establish a fund affiliated to the national fund for the dependants of those killed in the war. The assets shown on the balance sheet include: Real estate, £11,800,000 (£11,600,000); tools and transport equipment, £344,000 (£337,000); stock, half finished and complete goods, £11,500,000 (£7,700,000); bills, bonds, &c., £5,350,000, excluding £2,960,000 in the pension fund; bank balance £1,600,000 (£2,160,000); debtors (for goods delivered and payments to contractors, &c.), £5,150,000 (£2,630,000). Total assets, £37,400,000 (£30,100,000). Excluding the £1,720,000 yet to be called up, the share capital is £10,500,000 (£8,800,000). Liabilites in respect of statutory and special reserves amount to £1,850,000 (£1,660,000); guarantee funds, £890,000; welfare funds, £1,020,000; and loans, £2,410,000. Interest bearing deposits and balances due to employees £2,190,000 (£2,260,000). Payments received on account amount to £7,650,000 (£5,410,000) and creditors are shown at £5,420,000 (£5,150,000).

NEWS PARAGRAPHS.

Baltischer Lloyd.—According to *Hamburger Nachrichten*, the Russian Minister of Commerce is proposing to liquidate the steamship company "Baltischer Lloyd."

New Franco-Russian Company.—It is reported that a new Franco-Russian firm of shipowners is being established at Copenhagen, with a capital of £55,000, chiefly to handle goods and paper.

Furness Withy and the Johnston Line.—Furness Withy & Co., Ltd., which already has a very large interest in the Johnston Line, Ltd., has acquired the shares held by the Johnston family, and will assume entire proprietorship on January 1 next on the retirement of Mr. William and Mr. Edmund Johnston at that date.

Deutsche Ozean Rederei G.m.b.H., Bremen.—The objects of this newly founded company (£100,000 capital) are said to be "the working of shipping and the operation of and participation in any business or undertaking serving the interests of the company." Director Stapelfeldt, of the Norddeutscher Lloyd, is at present general manager.

Philadelphia-Mediterranean Service.—L. Rubelli's Sons, steamship agents and importers, Philadelphia, announce that after January 1 they will inaugurate a steamship service from Philadelphia to Mediterranean ports. Three steamers are now under consideration which it is likely will be placed in the service. These vessels will carry general cargoes to Italy, Southern France and Greece, bringing back fruit, sulphur and other merchandise.

Ship-Model Tank in Trondhjem.—The extension of all Norwegian yards and their undertaking the construction of large vessels make the provision of a national testing-tank a matter of urgent importance. A committee appointed to consider the addition of such equipment to the technical high-school at Trondhjem estimate the probable cost at £27,500, and if half this sum can be raised from Norwegian shipbuilders and owners, it is proposed to seek a grant from the Government for the remainder.

The Panama Canal.—Turner, Davidson & Co., Ltd., 1, Fenchurch Avenue, London, E.C., advise us as follows under date December 20:—"We are to-day in receipt of the following cable from Payne & Wardlaw, of Panama: 'Channel cleared to-day 80 ft. in width, 20 ft. in depth; dredgers passed here to-day. We expect ships now in the Canal to be passed through the Canal within the next few days. Prospects excellent; safe navigation second half of January. Cannot obtain official information.'"

Dutch Shipping and Suez Canal.—The Maatschappij Nederland and the Rotterdam Lloyd have had under consideration the question of a change of route from the Suez Canal to the Cape of Good Hope. The reasons for the change are said to be the fear of a possibility of a shortage of coal on the Canal route, the high premiums for insurance for vessels passing through the Mediterranean and the Suez Canal rates. It is believed that the expenses connected with a 12 days' longer voyage via the Cape will be less than the premiums and Canal charges on the Suez route. It is expected that in future the vessels will sail every 10 days, and that the new arrangement will come into force in January.

Walter Runciman & Co., Ltd.—There has been registered at Somerset House, Walter Runciman & Co., Ltd., the object of which is to acquire this well-known shipping business. The nominal capital of the company is £100,000 in £1 shares, and it is to take over the business of a steamship manager, owner, and broker carried on by Sir Walter Runciman, Bart., at Newcastle-on-Tyne as Walter Runciman & Co. The signatories to the memorandum of association are Walter Runciman, Moor Buildings, 56, Pilgrim Street, Newcastle-on-Tyne, shipowner, and John G. Humble, same address, shipowners' manager. The company is a private one. Sir Walter Runciman, Bart., is the first governing director, and may retain office while holding £10,000 shares. He may appoint an additional governing director, or resign and appoint a governing director in his place, and he may determine any such appointment and resume the office of sole governing director. He may also appoint ordinary directors.

Russian Shipping Estimates for 1916.—The Ministry of Trade and Industry has submitted the estimates for the Merchant Marine and Ports for the year 1916. The income is estimated at 8,732,450 roubles from the marine, or 128,500 roubles more than in 1915; port dues are estimated at 4,500,000 roubles, or, should the Dardanelles be opened, 8,000,000 roubles. The expenditure is estimated at 15,719,118 roubles, or 678,840 roubles more than for 1915. The war, of course, seriously disorganised the Russian merchant marine service, chiefly in the seas adjoining enemy countries. The Volunteer Fleet particularly was engaged in the transport of Government goods from America, Japan and Western Europe, in which service the vessels of the Northern Steamship Company were likewise engaged for the most part. The Ministry proposes subsidies to shipping companies amounting to 3,338,595 roubles, or 888,520 roubles more than in 1915. It also proposes to work out a programme of regular sailings under the Russian flag. A Petrograd paper, commenting on this intention, says no time is to be lost in the matter, as when sailings are resumed, Russia will be free from the German control, and an unprepared fleet may have to give way again to foreign organisation. The 1914 *projet de loi* on navigation premiums should likewise be promptly enacted, even if the burden be keenly felt by the Treasury, for the Near East should be at once brought within the sphere of Russian shipping activity. The effect of such premiums would also be felt in the national shipbuilding industry. But till the close of the war the policy must be limited to, as before, returning Suez Canal dues, encouraging coastal services, home shipbuilding, education in navigation, &c.

ORDERS PLACED.

The "Nederland" Stoomboots Maatschappij has ordered from the Nederlandsch Scheepsbouw Maats. a mail steamer of 10,000 gross tons register in replacement of the *Koningin Emma*. The new vessel will accommodate 181 first, 134 second, 36 third and 140 fourth-class passengers.

COMPANY REGISTRATIONS.

L. French & Co., Ltd.—Capital £2,000 in £1 shares. Objects, to carry on the business of chartering agents, shipbrokers, owners and charterers of and dealers in ships, barges, lighters, tugs and craft of all kinds. Louis French is the first managing director. Registered office, 57, Bishopsgate, E.C. Private company.

Spartan Steamship Company, Ltd.—Capital, £5,000, in £1 shares. Objects, to adopt an agreement between Olsen, Johnston & Co., and Smyth & Co., for the sale and purchase of the ss. *Wasis* of port of Pictou, Nova Scotia, and to carry on the business of shipowners in all its branches. First directors: T. W. Smyth (Chairman) and R. E. Lindley (both permanent). Qualification, £100. Registered office: 16, Eastcheap, E.C. Private company.

THE OVERDUE MARKET.

The following list contains vessels which are overdue or on which extra rates are considered to be necessary.

	Gns.
Invermark (s.v.). Fremantle, July 17, to Iquiqui	92
King Eduard (s.v.). Sabine to River Plate; lifeboat picked up...	92
Llandaff (s.v.). Port Arthur, Texas, August 13, to United Kingdom	92
Tellus. Ashore Nemuro	70

S.V. Sailing vessel.

The steamer *Rafael*, ashore in the Mersey, on which 30 guineas was quoted, has been floated.

The steamer *Minnesota*, in distress off San Francisco, on which 10 guineas was quoted, has arrived.

The sailing vessel *Cannebiere*, Buenos Ayres, September 19, to Havre, on which 7 guineas was quoted, has arrived.

"SHIPBUILDING AND SHIPPING RECORD" TABLE OF LAUNCHES.

Date of Launch.	Name of Vessel and Type.	Owners.	Builders	Approx. Dimensions. L × B. × D.	Propelling Machinery and Builders of Machinery.	Remarks.
Nov. 6 ..	**Andalusia** (cargo steamer)	Ångfartygs Aktiebolaget Göteborg Manchester	Oscarshamns Mekaniska Verkstads och Skeppsdockas Aktiebolag, Oscarshamn (Sweden)	270′ × 37′ 6″ × 17′ 9″	Tr. Exp., 783 × 800 × 1,308 mm. 838 mm. 900 i.h.p. Oscarshamns Works	2,200 tons d.w.
Nov. 17	**Chile,** m.s. (cargo) ..	East Asiatic Co.	Burmeister & Wain, Copenhagen	424′ × 55′ × 38′	Two Burmeister Diesel; 3,100 h.p. total, Burmeister & Wain	9,550 tons d.w., 11¼ knots.
Dec. 4 ..	**Bylayl** (collier) ..	Pocahontas Navigation Co., New York	New York S.B. Co., Camden, N.J.	319′ × 49½″ × 27½′	Tr. Exp., 1,800 i.h.p.	3,625 gross tonnage. 5,450 tons d.w. on 22′ draught. Speed 10½ knots.
Dec. 11	**Regin,** ss.	Erlinglund, Kristiania. Norway	A/S Sorlandets Skibsbyggeri, Fevig & A/S Fredriksstad mek. Verksted, Norway	265′ × 42′ × 20′ ..	Tr. Exp., 18, 29½, 50 × 36 .. Fredrikstad. Works, Norway)	3,080 d.w. cap.

"SHIPBUILDING AND SHIPPING RECORD" TABLE OF TRIAL TRIPS.

Oct. 30	**Simson,** icebreaking tugboat	Oxelösund Flan Wastmanando, Yärnvägs Aktiebolag. Oxelosund (Schweden)	Oscarshamns Mekaniska Verkstads Och Skeppsdockas Aktiebolag, Oscarshamn (Sweden)	103′ 7½″ × 28′ × 12′ 6″	Tr. Exp., 365 × 605 × 990 mm. 686 mm. 550 i.h.p. Oscarshamns Works	—
Nov. 21	**Pacific,** ss. (cargo) (ex *Annette Rolph*)	Ordered by Hind, Rolph & Co., San Francisco. Since sold to Norwegian purchasers	Union Iron Works Co. ...	400′ × 56′ × 32′	G.E. geared turbines, 2,400 s.h.p.	9,000 tons d.w. 25′ 9′ draught.
Dec. ..	**Barentsz,** ss. (pass. and cargo)	Koninklijke Paketvaart Maatschappij, Amsterdam	Nederlandsche Scheeps. Maatschappij, Amsterdam	383½′ × 48½′ × 30′	Tr. Exp., 3,150 i.h.p. Nederlandsche Fabriek van Werk. Spoor, Amsterdam	4,050 tons d.w. Displacement 7,650 tons. 12 knots on 20 ft. draught.
Dec. ...	**Conyngham** (t.b.d.) ...	U.S.A. Government ...	W. Cramp & Sons, S. & E.B. Co., Philadelphia	310′ long	17,000 s.h.p.	1,090 displacement on 9′ 2″ draught.
Dec. 17	**Cumberland,** t.s.s. (meat carrying steamer)	Federal Steam Nav. Co., London	W. Hamilton & Co., Port Glasgow	496′ × 60′ × 39′ 6″	Twin-screw geared turbines by D. Rowan & Co., Glasgow	Deadweight carrying capacity 10,400 tons. Speed 16 knots.

"SHIPBUILDING AND SHIPPING RECORD" TABLE OF MARINE CASUALTIES

(Including losses incidental to the war).

Vessel.	Gross Tonnage.	Owners, Builders and Year Built.	Casualty.
Bremen, (German cruiser)	3,250	German Government	DEC. 19: Reported sunk by submarine in Baltic; also torpedo boat accompanying cruiser.
Brynhild, ss.	1,179	Rederiakt. Svenske (K. Ancher), Stockholm Kish, Boolds & Co., Sunderland. (1882.)	See *S. & S.R.*, Dec. 9. DEC. 10: Waiting for calmer weather to attempt salvage Vessel lying with stern under water and covered with ice.
Bunz (German patrol boat)	-	German Government	DEC. 17: Reported "sunk."
Djurjura, ss.	1,852	Cie. de Nav. Mixte, Marseilles .. .. Wigham, Richardson & Co., Newcastle. (1887.)	DEC. 17: Collided with another vessel and sank.
Hong Wan I, ss.	3,230	Ho Hong S.S. Co., Singapore .. .. C. Connell & Co., Glasgow. (1876.)	DEC. 18: Amoy to Singapore. General Cargo. Encountered typhoon in China Sea. Lifeboats washed overboard. Much damage.
Intrepido (Italian destroyer)	-	Italian Government	DEC. 15: Struck mine and sank.
Levenpool, ss.	4,844	Pool S.S. Co. (R. Ropner & Co.), W. Hartlepool. Ropner & Sons, Stockton. (1911.)	DEC. 17: Reported "sunk."
Lucy Neff, ss.	946	C. L. Dimon, San Francisco .. .. .. J. Davidson, W. Bay City, Mich. (1893.)	DEC. 16: Foundered off Fenwick Island in gale.
Meuse, ss.	4,075	Cie. de Nav. d'Orbigny (A. Capelle), La Rochelle Sunderland S.B. Co., Sunderland. (1914.)	DEC. 15: In collision with steamer *Timgad*.
Minsk, ss.	1,229	Det Forenede D.S., Copenhagen .. .. Akt. Burmeister & Wain, Copenhagen. (1911.)	DEC. 10: Valencia for Copenhagen. Cargo oranges. Beached Lincolnshire coast. Considerably damaged by explosion. Water in Nos. 1, 2 and 3 holds.
Nellie Grant, s.v.	139	Whitcomb, Haynes & Co., Ellsworth, Maine. Built at Ellsworth, Maine. (1873.)	DEC. 7: Ashore at Boca Grande. Total wreck. Crew saved.
Nico, ss.	712	Akties. Nico (N. Wiborg), Kragerö .. .. Akers Mek. Vaerks., Christiania. (1913.)	DEC. 18: Reported "sunk."
Porto Said, ss.	5,301	Soc. Marittima Italiana, Genoa .. .. W. Denny & Bros., Dumbarton. (1884.)	DEC. 16: Reported "sunk."
Re Umberto, ss.	2,952	Semidei & Ferrari, Genoa .. .. .. G. Ansaldo & Co., Sestri-Ponente. (1892.)	DEC. 15: Struck mine and sank.
St. Kilda, ss.	3,947	British & Foreign S.S. Co. (Rankin, Gilmour & Co., Liverpool) W. Hamilton & Co., Pt. Glasgow. (1911.)	See *S. & S.R.*, Dec. 16. DEC. 15: Impossible to refloat her.

"SHIPBUILDING AND SHIPPING RECORD" TABLE OF SHIP SALES.

Name and type.	Tonnage.	Dimensions. Draught in ( ).	Sold by, to	Builders, hull and year.	Machinery and builders.	Remarks.
Achecolanda, ss.	2,124 gr. 1,263 net. 3,550 d.w.	286′ × 43½′ × 18½′ (18′).	Cia. Algortena de Nav., Bilbao, to Norwegian buyers	W. Pickersgill & Sons, Sunderland. (1899.)	21, 35, 57½ × 39 (G. Clark, Sunderland)	Price about £52,000. Changed hands in June, 1914, for about £14,000.
Alfred Kreglinger, ss.	994 gr. 700 net. 1,510 d.w.	210½′ × 33½′ × 13½′	Cie Belge-Scandinave de Nav. a Vap. (Soc. Anon.) (Antwerp), London, to buyers not stated	Osbourne, Graham & Co., Sunderland. (1909.)	16, 27, 44 × 30 (Richardsons, Westgarth, & Co., Sunderland).	Price about £35,000.
Allie, ss. (well deck) (ex *Cachalote II*, ex *Allie*)	1,127 gr. 697 net. 1,750 d.w.	233½′ × 33′ × 14½′ (15½′)	Allen, Adams & Co., Southampton, to Stone & Rolfe, Llanelly	W. Harkess & Son, Middlesbrough. (1899.)	16½, 27, 44 ×30 (Sir C. Furness, Westgarth & Co., Middlesbrough)	—
Alumna, s.v. ..	696 gr. 644 net.	189′ × 40′ × 15½′	Simpson Lumber Co., Coos Bay, Oregon, to A. F. Thane & Co.	North Bend Mill Co., North Bend, Oregon. (1901.)	—	—
Aries, ss. ..	3,071 gr. 1,968 net. 5,000 d.w.	325′ × 47′ × 22½′ (20½′)	Rickinson, Sons & Co., W. Hartlepool, to Jackson Bros. & Cory, London	W. Gray & Co., W. Hartlepool. (1895.)	24, 38, 64 × 42 (Cen. Mar. Eng. Works, W. Hartlepool)	
Assouan, ss. (ex *Pandora*)	2,765 gr. 1,780 net. 4,000 d.w.	344′ × 37½′ × 24½′	Khedivial Mail S.S. & Graving Dock Co., to British buyers	Lloyd Austro - Ungarico, Trieste. (1882.)	38, 72½ × 48 (Austrian Lloyd's Arsenal)	
Balboa, ss. (spar dk.)	1,324 gr. 829 net. 1,910 d.w.	239′ × 33½′ × 12½′ (18½′)	Balboa S.S. Co. (R. MacAndrew & Co.), Liverpool, to the Entente S.S. Co. (Leopold, Walford & Co., London)	Wood, Skinner & Co., Newcastle. (1894.)	19, 31, 51 × 33 (N.E. Mar. Eng. Co., Sunderland)	
Beothic, ss. (shelter dk.)	1,134 gr. 464 net.	240′ × 35½′ × 16½′ (18½′)	Thetis S.S. Co. (Job Bros. & Co.), St. Johns, Newfoundland, to the Russian Government	D. & W. Henderson & Co., Glasgow. (1909.)	22, 36, 59 × 39 (D. & W. Henderson & Co.)	Price about £58,000.
Eleanor A. Percy, s.v.	3,402 gr. 3,062 net.	323½′ × 50′ × 24½′	Percy & Small, Bath, Maine, to New York buyers	Percy & Small, Bath, Maine. (1900.)	—	Price about £25,000.
Eurana, ss. ..	9,000	400′ × 56′ × 32′ (25¾′)	Hind, Rolph & Co., San Francisco, to Mr. Strachan, of Savannah, Ga., U.S.A.	—	—	Price about £150,000.
Frederick, iron ss. (ex *Hudson*)	1,873 gr. 1,310 net.	287½′ × 34′ × 23′	Merchants & Miners' Transp. Co., Baltimore, to Mors einterests of New York	The Pusey & Jones Co., Wilmington, Del. (1874.)	48 × 72 (The Pusey & Jones Co.)	For cargo trade. All passenger accommodation removed. Masts shortened, &c.
George Hawley, ss.	2,549 gr. 1,699 net.	247′ × 43½′ × 28½′	Boston Virginia Transp. Co. (C. G. Stoddard), New York. to Mexican Oil Co.	Gt. Lakes Eng. Works, Ashtabula. (1912.)	21, 34½, 57 × 42 (Gt. Lakes Eng. Works, Detroit)	
George E. Warren, ss.	2,306 gr. 1,616 net.	246½′ × 43½′ × 25¼′	Boston Virginia Transp. Co. (C. G. Stoddard), New York, to Mexican Oil Co.	Toledo S.B. Co., Toledo, Ohio. (1912.)	21, 34½, 57 × 42 (Toledo S.B. Co.)	
Lady of Gaspé, ss. (ex *Restigonche*, ex *Rathlin*)	1,189 gr. 705 net.	229½′ × 31′ × 16′	Gaspé S.S. Co., Quebec, to J. C. Fectau, Quebec, at auction	Blackwood & Gordon, Pt. Glasgow. (1877.)	26 52 × 57 (Blackwood & Gordon)	Price about £2,040.
Leonatus, ss. (ex *Scarsdale*)	2,099 gr. 1,343 net. 3,540 d.w.	290½′ × 42′ × 19½′ (19¼′)	J. Gaff & Co., Glasgow, to British buyers	Richardson, Duck & Co., Stockton. (1903.)	21½, 35½, 58½ × 39 (Blair & & Co., Stockton)	—
Luzon, ss. (spar dk.)	4,160 gr. 3,181 net.	340′ × 47½′ × 19½′ (24½′)	Soc. Anon. Ungherese di Armamento Maritt. "Orient," Fiume, acquired by Italian State Railways	R. Stephenson & Co., Newcastle. (1902.)	25, 40, 67 × 45 (Richardsons, Westgarth & Co., Middlesbrough)	—
L. V. Stoddard, ss.	2,306 gr. 1,616 net.	246½′ × 43½′ × 25¼′	Boston Virginia Transp. Co. (C. G. Stoddard), New York, to Mexican Oil Co.	Toledo S.B. Co., Toledo, Ohio. (1912.)	21, 34½, 57 × 42 (Toledo S.B. Co.)	To be equipped with tanks to carry oil in bulk.
Lysglimt, s.v. (ex *Duguesclin*)	1,488 gr. 1,332 net.	244′ × 36′ × 21½′	H. Jacobsen, Sarpsborg, to Norwegian buyers	A. Dubigeon, Nantes. (1894.)	—	Price about 220,000 kr.
Minto, ss. (ice-breaker)	1,090 gr. 446 net.	225′ × 32½′ × 18′	Canadian Govt., Ottawa, to Russian Govt.	Gourlay Bros., & Co., Dundee. (1899.)	26, 41, 65 × 39 (Gourlay Bros. & Co.)	Will be used for keeping port of Archangel open during winter.
Pacific, ss. (ex *Annette Rolph*)	9,000 d.w.	400′ × 56′ × 32′ (25¾′)	Hind, Rolph & Co., San Francisco, to Norwegian purchasers	Union Iron Works Co., San Francisco. (1915.)	—	—
Sappho, ss. ..	276 gr. 138 net.	149½′ × 28½′ × 9½′	Maine Central R.R. Co., Portland, Maine, to Wright & Cobb Transp. Co., New York	New England S.B. Co., Bath, Maine. (1886.)	15, 24, 37½ × 30	For passenger service.
Sausalito, s.v.	367 gr. 326 net.	142½′ × 35½′ × 10′	A. F. Estabrook Co., San Francisco, to Crowley Launch & Tugboat Co.	Built at San Francisco. (1903)	—	To be equipped with auxiliary engines later.
Swanbridge, ss. (ex *Hellenes*, ex *Fram*, ex *Hellenes*)	1,945 gr. 1,170 net.	270½′ × 40½′ × 18½′ (19′)	T. L. Weiss, Newcastle, to buyers not stated	W. Pickersgill & Sons, Sunderland. (1884.)	30, 62 × 42 (G. Clark, Sunderland)	Price about £30,000.
Taga Maru, ss. (spar dk.) (ex *Amara*)	2,610 gr. 1,618 net.	289½′ × 40½′ × 16½′	N. Aso. Nishinomiya, to buyers not stated	J. Blumer & Co., Sunderland. (1891.)	23½, 38, 62 × 42 (N.E. Mar. Eng. Co., Sunderland)	Price about £26,000.
Thos. L. Wand ss. (wooden)	657 gr. 413 net.	174′ × 38′ × 12¼′	Olson & Mahony, San Francisco, to J. H. Baxter, per Wilson & Fife	J. Lindstrom, Aberdeen, Wh. (1906.)	14, 32 × 24 (Fulton E. & S.B. Works, San Francisco)	—
Van Allens-Boughton, s.v.	2,129 gr. 1,905 net.	264½′ × 46½′ × 22½′	Coastwise Transp. Co., Boston, to New York buyers	H. M. Bean, Camden, Me. (1900.)	—	
Westgate, s.v.	1,921 gr. 1,814 net. 2,900 d.w.	259′ × 40½′ × 24¼′	J. Stewart & Co., Liverpool, to J. G. Murphy, Quebec	R & J. Evans & Co., Liverpool. (1885.)		—

John Hall, Junr., & Co., 59, Mark Lane, E.C., write us as follows with reference to a report which was current last week that they had disposed of their ss. *Ancona*:—"The report of the sale of this steamer" they say, "is absolutely erroneous. She has not been sold, or even offered for sale, and we have no intention of selling her."

SHIPPING SHARE MARKET.

There has again been considerable activity in the stock markets concerned with transactions in steamship companies' shares. The feature has been the further recovery in Royal Mail Steam Packet shares. Late on Thursday there was a few persistent buyers of the shares which had in the morning changed hands at 99½, and on Friday there was a "blaze" of buying, nearly 20 transactions being "marked" in the shares at prices ranging from 103 to 105½, accompanied by rumours of an impending amalgamation between the Royal Mail, the Cunard and the Furness Withy lines. The report has not received any confirmation, and the officials of the company do not apparently think it serious enough to issue a formal denial. Whatever object the Stock Exchange operators had in buying there is little evidence of it being due to an impending amalgamation between the Royal Mail and the Cunard. Before the days when Sir Owen Philipps took over the chairmanship of the company there were always afloat rumours that the company's ships were to be sold and the undertaking wound up, and now that the position of the Royal Mail is reversed there are persistent reports of amalgamation with this or that concern. The announcement that the entire interests of the Johnston family in the Johnston line have been acquired by Furness, Withy & Co. does not come with any surprise to the market. The Furness-Withy Co. acquired "an interest" in this line two years ago, and four of the company's directors with four of the original directors of the Johnston Company have since formed the board of administration. Now the members of the Johnston family have retired from the board and Furness, Withy & Co. have acquired the control. The Johnston line is one of the best-known transatlantic lines, and it is interesting at this juncture to remember that it has an enormous business with Rotterdam and in normal times had also a line of steamers operating between Liverpool and the Danube. The Orient Steam Navigation Company's report and accounts showing a fall of £26,200 in trading profits did not affect the market, which had anticipated this result.

SHIPPING, SHIPBUILDING, ENGINEERING AND MARINE INSURANCE SHARE LIST.

SHIPPING AND DOCKS.

Name.	Share and paid.	Extreme quotations, 1913.	Last ann. div. % or per share.	Yield. %	Quotation, July 30, 1914.	Cash price during week.
	£					
African S.S.	20	21⅜—19 1/16	7	7	18—20	18—20
Allan Line ... ... Deb.	100	95—89	4	4½	93½—95½	94
Anchor Line ... Cum. pref.	10	10 1/16—10	5½	5½	10—10⅛	10 3/16
Do. ... ... Deb.	Stk.	98⅛—95⅛	4⅛	4 5/16	104—106	102½
Argentine Nav. ... Cum. pref.	1	29/6—25/3	3	4½	9/16—1/16	⅛
Do. ... ... Deb.	Bds.	104⅛—100¼	6	6⅛	98—100	93
Australasian Un. S. Nav. Deb.	Stk.	84⅛—81⅛	4	4 1/16	80—83	82⅜
Belfast Steam ... ... "A"	10 (5pd.)	5⅛—4⅛	5	5	4½—5½	5
British & African Nav. Deb.	Stk.	102—101	4½	4½	96½—98½	99½
British India Nav. ... Deb.	Stk.	104—98⅛	4½	4⅛	99½—100	93½
Bucknall SS. ... Cum. pref.	2	2⅛—1¾	5½	—	—	—
Cairn Line ... ... Deb.	Bds.	102—94	5	5 1/16	91—93	99½
Clan Line ... ... Ord.	10	142—9	15	10⅛	10⅜—11	-
Court Line ... ... Ord.	£1	—	10	7 1/16	—	1 5/16
Cunard SS. ... ... Ord.	1	35/9 28/-	20	5½	1⅜—1½	3 1/16
Do. ... Cum. pref.	Stk.	103—97⅛	5	5⅛	99—101	92
Do. ... ... Deb.	Stk.	102⅛—99	4⅛	4⅛	101—103	96½
Elder Line ... ... Deb.	Stk.	103—100	4½	5	98—102	90
Elder Dempster ... Cum. pref.	1	1 1/16—1/8	5½	5 1/16	1/8—1 3/16	1/16
Do. ... ... Deb.	Stk.	105—99⅛	5	5⅛	102—104	91⅛
Ellerman Lines ... Pref. Ord.	10	10⅛—10 7/16	6¼	6⅛	10—10⅛	9⅜
Do. ... Cum. pref.	10	10 1/16—10 3/16	4⅛	4⅛	10—10⅛	9⅛
France Fenwick ... Cum. pref.	5	97/6—92/6	5½	6⅛	4½—5	4⅛
Furness, Withy ... Ord.	1	34/3—25/6	10	5½	1¼—1⅜	1¼
Do. ... Cum. pref.	10	9⅜—9⅛	5	5⅛	9⅜—10	9⅛
General Steam Nav. ... Ord.	7½	6 1/16—5⅞	6	7	5⅜—5⅝	6⅛
Do. ... ... Pref.	8	7⅛—7⅜	6	7⅛	7⅞—7¾	6⅝
Houlder Line ... Cum. pref.	5	85 —60 -	Nil	Nil.	2⅜—2⅛	3½
Do. ... ... Deb.	Stk.	84½—80	4⅛	5 1/16	81—86	84⅛
Houlder Bros. ... Cum. pref.	5	4⅛—3	5⅜	5½	4⅜—4⅛	4¼
Do. ... ... Deb.	Stk.	85—78	4⅛	5½	81—86	82
India Gen. Nav. & Rly. ... Ord.	10	9⅜—7 1/16	6	7 1/16	9—10	8⅛
Indo-China N. ... Pref Ord.	5	5 1/16—87/6	6	5½	3½—4⅛	5⅛
Irrawaddy Flotilla	40	125—114	15	5 1/16	126⅛—128½	—
King Line ... ... Ord.	10	9 1/16—8	8	6⅛	8⅜—9¼	12½
La Guaira Harbour ... Deb.	Stk.	87—79	5	7½	78—80	65½
Lamport & Holt ... Cum. pref.	£1	1 1/16—2/8	6	6	1/16—1 1/16	3/16
Leyland (F.) ... Cum. pref.	10	11—9⅜	30	—	7¼—8½	7 1/16
Do. ... ... Deb.	100	99½—95⅛	4	4	99—101	—
Mercantile SS. ... ... Ord.	5	8 1/16—6¾	17½	8½	6—6⅛	11 1/16
Do. ... ... Pref.	1	18/—16/3	5	5⅛	¾—1	1/16
Moor Line ... ... Ord.	10	14—11 1/16	15	—	—	—
Nelson Steam Nav. ... Deb.	100	103⅛—99	5	5½	99½—101½	98
New Zealand ... ... Ord.	£10	20½—10⅜	8	4½	14⅜—15⅜	19 7/16
Do. ... ... Deb.	Stk.	95—92⅛	4	4½	92—94	89⅛
Nitrate Producers SS. ... Ord.	5	8⅛—8	17½	5½	8—8⅛	16⅛
Do. ... Cum. pref.	5	5—97/6	5	5	4½—5	4½—5
Oceanic Steam. Nav. ... Deb.	100	100—96⅛	4½	4⅜	97—99	98⅜
Orient.Stm.Nav.Co. Cum. pref.	10	10⅜—9 1/16	5	5 1/16	9⅛—10	9 1/16
Do. ... ... Deb.	100	99—94⅜	4⅛	4¼	98—100	96⅜
P. & O. S. N. ... Cum pref.	100	125⅛—107	5	5¼	109—112	94½
Do. ... ... Def.	100	350—270	15	5⅜	270—290	279
Do. ... ... Deb.	Stk.	91—83	3⅛	5	84—86	70½
Prince Line	1	25/3—20/-	5	2⅜	1—1⅛	—
R.M.S.P. ... ... Ord.	100	143—100⅜	Nil.	Nil.	82—87	102
Do. ... ... Pref.	Stk.	100⅜—96	5	5⅜	98—101	86
Do. ... ... Deb.	Stk.	104⅜—100⅜	4½	5¼	101—103	89½
Shaw, Savill & Alb. Cum. pref.	5	5 1/16—96/3	5	5	4⅛—5	4⅜—5
Shell Transport ... ... Ord.	1	5⅛—96/10⅜	30	6⅛	4—4⅛	4⅛
Do. ... Cum pref.	10	11 7/16—10	5	5 1/16	10⅜—10⅝	9 15/16
Sutherland SS. Co.	£1	1⅛—1	20	13⅜	1—1⅛	1⅜
Union-Castle SS. Cum. pref.	10	10—9⅜	4½	5	8⅜—9⅛	8
Do. ... ... Deb.	Stk.	95⅜—92	4	4⅜	93—95	88⅜
West Hartlepool ... ... Pref.	10	4¼—3 3/16	5½	9½	2⅜—3⅛	5 1/16

INSURANCE.

Alliance	20 (2·4 pd.)	12 7/16—11⅜	12/-	7	11⅞—12⅜	9
Do. (new shares)	1	14 7/16—12⅜	12/-	5⅞	13⅜—14⅜	10½
Indem. Mutual Marine	15 (3 pd.)	10 1/16—8⅛	18½	6 1/16	10—11	9⅛
London Assurance	25 (2½ pd.)	54—49	20	6	54—56	42½
Marine Insurance	25 (15 pd.)	38⅜—36½	45/-	6⅞	38⅜—39⅜	35¼
Maritime Insurance	10 (2 pd.)	5⅜—4 1/16	12½	—	8 1/16—8⅜	—
Merchants' Marine Insurance ...	10 (2½ pd.)	68/3—61/3	7⅜	5	4—4¼	3⅞
N. British & Mercantile Ord.	25 (6¼ pd.)	40½—38½	40/-	6½	40⅜—41½	29⅜
Do. Pref.	Stk.	100⅜—95½	4	5¼	98—100	77⅜
Phœnix Assurance	10 (1 pd.)	7⅜—7	40	6¼	7⅞—8¼	5½
Reliance Marine	10 (2 pd.)	7—6½	17½	5 1/16	7 1/16—7⅜	6
Royal Exchange Assurance ...	Stk.	210—196½	10	5⅛	213—218	183
Sea Insurance	10 (2 pd.)	20—17½	8	5	20—21	16 1/16
World Marine, Limited ...	5 (2 pd.)	25 —23 1/16	5	5¼	1 1/16—1 3/16	1 1/16

* With arrears. † Includes 2½% bonus.

IRON AND STEEL.

Name.	Share and paid.	Extreme quotations, 1913.	Last ann. div. % or per share.	Yield. %	Quotation, July 30, 1914.	Cash price during week.
	£					
Babcock & Wilcox... ... Ord.	1	69 4⅛—56/3	14	6½	2⅜—2⅞	2⅛
Baldwins ... Cum. pref.	1	22/6—21/3	5⅜	5 1/16	1 1/16—1 3/16	1 1/16
Do. ... ... Deb.	Stk.	100½—100¼	4⅜	4⅜	97—99	98
Bayliss, Jones ... Cum. pref.	1	—	5	7⅛	⅜—⅝	1/16
Bell Bros. ... ... Cum. pref.	10	12 1/16—11	6	5 1/16	11⅛—12⅛	10½
Do. ... ... Deb.	Stk.	98—96⅜	4	4 1/16	96—98	96—98
Bessemer (Henry) ... Ord.	1	1 5/16—1 1/16	10	8⅜	1 1/16—1 1/16	1 3/16
Bolckow Vaughan ... Ord.	1	22/6-19/4⅜	6	6⅜	1 1/16—1⅛	1 5/16
Do. ... ... Cum. pref.	20	21⅛—20/-	5	5⅜	20—21	19⅜
Cargo Fleet Iron ... ... Ord.	1	11/10⅜—7/6	2⅜	5	1/16—1/16	⅛
Do. ... ... Deb.	100	91—85⅜	4⅜	5	89—92	89
Consett Iron Co. ... ... Ord.	1	88/6—74/6	12½	4½	3⅜—3⅞	2 1/16
Dominion Iron & Steel	Bds.	100½—88⅛	5	6¼	83—87	74 1/16
Dorman, Long ... ... Ord.	1	21/6—16/9	8	7	3 5/16—3 9/16	1 1/16
Do. ... ... Deb.	Stk.	88⅛—85⅜	4	4⅜	87—90	84 1/16
Ebbw Vale Steel & Iron Ord.	1	18/—16/-	7½	7 1/16	3 5/16—3 7/16	3 3/16
Guest, Keen & Nettefids Ord.	1	68/9—61/3	15	5	3 9/16—3 11/16	3 1/16
Do. ... ... Cum. pref.	5	5⅜—5⅜	5	4⅜	5 1/16—5 1/16	5 1/16
Do. ... ... Deb.	Stk.	100⅜—95⅜	4	4½	96—98	80 5/16
Hadfield's Steel Foundry Ord.	1	63/—58/9	22½	6¼	3—3⅛	3 1/16
Hawthorn (R. & W.) Leslie Ord.	10	13—12	10	7⅜	13⅜—13⅝	12 7/8—13⅛
Ibbotson Bros.	5 (4 pd.)	7—5⅜	7½	4¼	6—6¼	6¼
Jessop (W.) & Sons ... Ord.	5 (4 pd.)	6⅜—6⅜	15	8½	6⅜—6⅜	7⅛
Lanarkshire Steel Cum. pref.	10	7⅜—6¾	5	6⅜	5¼—6⅜	7⅛
Lysaght (J.) ... Cum. pref.	1	27/6—25/-	6	5	1⅛—1⅜	1¼
Do. ... ... Deb.	Stk.	108⅛—102⅛	4½	—	104—106	—
Manganese Bronze ... Ord.	1	⅜—⅛	6	11	⅛—⅜	3/16
Do. ... ... Cum. pref.	1	1—⅝	6	6 1/16	¾—1	¾
North-Eastern Steel ... Deb.	Stk.	89—92	4½	—	—	—
Palmers Ship & Iron "A"	1	5/16—3/16	Nil.	Nil.	3/16—3/16	1/16
Scott (Walter) ... ... Ord.	1	16/—14/6	7½	10⅝	⅜—¼	¼
Do. ... ... Deb.	Stk.	86—82	4	4 1/16	81—82	86—91
Sheffield Forge ... ... Ord.	1	1⅞—1⅜	12½	6⅜	1⅜—1⅜	1⅜
Shelton Iron & Steel ... Deb.	100	99⅜—90	5	5¼	93—98xd	94⅜
S. Durham Steel & Iron Ord.	1	35/—23/6	10	8	1 5/16—1⅛	1 5/16
Do ... ... Cum. pref.	1	20/6—19/-	6	5 1/16	1 3/16—1 5/16	1 1/16
Do. ... ... Deb.	Stk.	95—98	4⅜	4⅜	90—92	90—92
Steel Co. of Scotland ... Ord.	10	12⅜—8¾	5	5⅜	8⅜—9	8¾—9 1/16
Stewarts & Lloyds Pref. ord.	10	21 7/16—20	10	5⅜	20—21	19⅜
Do. ... ... Cum. pref.	10	14 5/16—13⅛	6	4⅜	11 5/16—13 7/16	13 1/16
Stone (J.) ... ... Cum. pref.	10	9⅛—9	5	5⅜	8¾—9¼xd	9 1/16
United States Steel ... Ord.	100$	71⅛—50	3	3⅛	61—61⅛	90 1/16
Do. ... ... Cum. pref.	100$	113⅜—104½	7	5⅜	112—113	122⅜
Vickers Ltd. ... ... Ord.	1	43/6—33/3	12½	7⅜	1 1/16—1⅜	1 1/16
Do. ... ... Pref.	Stk.	106½—99	5	5⅜	104—107	92
Do. ... ... Deb.	Stk.	100⅜—91½	4	4⅜	96⅜—98⅜	83⅞
Weardale Steel ... Def. ord.	1	21/—17/-	6	7⅜	⅜—½	⅜
Do. ... ... Cum. pref.	1	20/1⅜—18/-	6	6⅜	1⅜—1	1⅜
Do. ... ... Deb.	Stk.	77—73¼	4	5	77—80	77—80
Workington Iron & Steel Ord.	1	16/6—12/3	4	5⅜	2½—2¾	1 1/16

SHIPBUILDING AND MARINE ENGINEERING.

Armstrong, Whitworth Ord.	1	60 —39/	12½	7⅜	13 1/16—2 3/16	1 1/16
Do. ... ... Cum. pref.	5	95/—84/6	4	6	4 1/16—4 1/16	3⅜
Do. ... ... Deb.	Stk.	98¼—94⅜	5	6½	96—98	80½
Beardmore (W.) ... ... Deb.	100	96¾—91½	4½	5¼	94—98	89
Brown (John) ... ... Ord.	1 (15s. pd.)	23/—17/9	12½	9⅜	2 5/16—3 1/16xd	3 1/16
Do. ... ... Cum. pref.	10	10¼—9 1/8	5	5 1/16	9¼—10xd	8 15/16
Cammell Laird ... ... Ord.	5	3⅜—2⅞	7⅜	7 1/16	3⅜—4⅛	4⅜
Do. ... ... Cum. pref.	5	92/6—79/-	5	6½	4¼—4⅝	3⅝
Do. ... ... Deb.	100	90⅜—84¼	4⅜	5	92—94	90
Dunlop (Jas.) ... ... Ord.	1	18/6—17/6	Nil.	—	1⅛—2⅛	1 1/16
Do. ... ... Cum. pref.	1	1⅛—⅞	6	7⅛	⅞—1	15/16
Fairfield Shipbldg Cum. pref.	10	10—7⅞	6	8 1/16	—	7⅞
Fleming & Ferguson ... Ord.	10	20¾—12½	10	7	14¼—14¾	14¼
Gray (Wm.) ... ... Deb.	100	100⅜—100	4⅜	4⅜	100-102	100⅜
Henderson (D. & W.) Cum. pref.	1	⅜—7/16	5	8⅜	7/16—⅜	7/16
Richardsons Westgarth Ord.	1	3/6—1/9	Nil.	Nil.	1/16—⅛	3/16
Do. ... ... Cum. pref.	1	9/9—4/3	Nil.	Nil.	⅛—¼	1/16
Do. ... ... Deb.	Stk.	70—58	4½	6⅜	55—58	69½
Simons (W.) ... Cum. pref.	10	10½—10	5	5	10¼—10⅜	9 15/16
Stephenson (R.) ... ... Ord.	1	66⅜—53	Nil.	Nil.	—	—
Do. ... ... Deb.	Stk.	66¼—63	Nil.	Nil.	—	—
Swan, Hunter & W. R. ... Ord.	1	19/10⅜-16/-	†10	8	1⅛—1	1⅛
Do. ... ... Cum. pref.	1	19/9—17/9	5	5⅜	1 1/16—1	1 1/16
Do. ... ... Deb.	Stk.	90⅜—88	4⅛	4 7/16	90—93	90 - 93
Thornycroft (John I.) ... Ord.	1	27/6—12/6	8	8	⅜—⅜	1⅛
Do. ... ... Cum. pref	1	19/3—11/3	6	7⅜	⅜—⅜	⅜
Do. ... ... Deb.	100	94—91	5	5⅜	88—92	93
Wallsend Slipway ... Ord.	1	1 1/16—1/8	10	—	1⅛—1⅛	—
Do. ... ... Cum. pref.	1	20/—20/-	5	—	1 1/16—1 1/16	—

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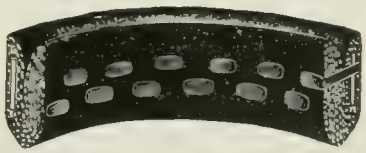

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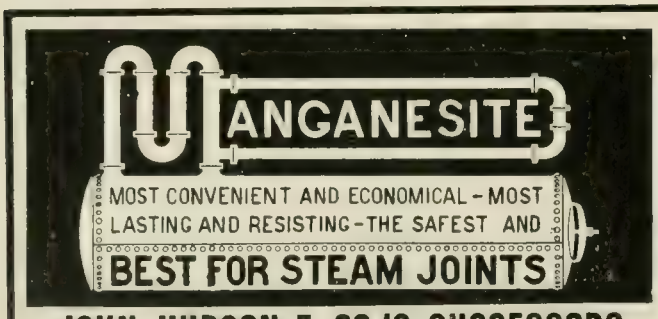

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Heinke, C. E., & Co., 88, 89, Grange Road, Bermondsey, S.E.
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Belliss & Morcom, Ltd., Birmingham.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Dawson & Downie, Elgin Works, Clydebank.
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ALUMINIUM PAINT—
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Hingley & Sons, Ltd., Netherton Iron Works, Dudley, Staffs. [on-Tyne.
Spencer, John, & Sons, Ltd., Steel Works, Newburn-
Sykes, Richard, & Son, Ltd., Cradley Heath.
Taylor, Samuel, & Sons (Brierley Hill), Ltd., Brierley Hill, Staffs.
Wright, Joseph, & Co., Ltd., Tipton, Staffs.
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Hamilton, Archd., & Co., Possilpark, Glasgow.
Holzapfels, Ltd., Newcastle-on-Tyne.
Hoyle, Robson, Barnett & Co., Ltd., St. Nicholas Chambers, Newcastle on-Tyne.
Milburn, A., & Co., Sunderland.
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McRobie, John, & Sons, 94, Elliott Street,
ASBESTOS GOODS— Cranstonhill, Glasgow.
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Jones, Fredk., & Co., Ltd., Perren Street, Kentish Town, N.W.
Walker, Jas., & Co., 11, Bishop Court, Anderston,
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Speedings Ltd., Sail Works, Sunderland.
ASH BINS—
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Hingley & Lamb, Ltd., Stour Works, Lye, Worcs.
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Trewent & Proctor, F. J., Ltd., 43, Billiter
AWNINGS— Buildings, E.C.
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BARROWS—
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BLOCKS— Sheffield.
Higginson & Co., 7, Hurst Street, Liverpool.
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Davidson & Co., Ltd., Sirocco Engineering Works,
Keith, James, & Blackman Co., Ltd., 27, Farringdon Avenue, London, E.C.
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Leitch, John, & Co., The Ferry, Renfrew, Scotland.
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Elliot & Jeffery, East Dock, Cardiff.
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Perman & Co., Ltd., 82-83, Fenchurch Street, E.C.
Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne.
White, J. Samuel, & Co., East Cowes, I.W.

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McRobie, John, & Sons, 94, Elliott Street, Cranstonhill, Glasgow.
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Rennie & Co., North Greenhill Road, Paisley.
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BRASSWORK—
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Stone, J., & Co., Ltd., Deptford, London, S.E.
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Glamorgan Coal Co., Ltd., Cambrian Bldgs., Cardiff.
Harrisons (London), Ltd., 66, Mark Lane, E.C.
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DRILLS—
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Holmes, J. H., & Co., Portland Road, Newcastle-on-Tyne.

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British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [Edinburgh.
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Ransomes & Rapier, Ltd., 32, Victoria Street, London, S.W.
Stothert & Pitt, Ltd., Bath.

ELECTRIC DERRICKS—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.

ELECTRIC DYNAMOS & MOTORS—
Boothroyd, H. T., Ltd., Bootle, Liverpool.
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Greenwood & Batley, Ltd., Albion Works, Leeds.
Holmes, J. H., & Co., Portland Road, Newcastle-
Mather & Platt, Ltd., Manchester. on-Tyne.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

ELECTRIC FITTINGS—
Durham, Churchill & Co., Grimesthorpe, Sheffield.

ELECTRIC HEATING & COOKING APPARATUS—
British Thomson-Houston Co., Ltd., Rugby.
McGeoch, Wm., & Co., Ltd., 28, West Campbell Street, Glasgow.

ELECTRIC LAMPS—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
McGeoch, Wm., & Co., Ltd., 28, West Campbell Street, Glasgow.

ELECTRIC LIGHTING—
Boothroyd, H. T., Ltd., Bootle, Liverpool.
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-
Mather & Platt, Ltd., Manchester.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

ELECTRIC-LIGHTING PLANT—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Greenwood & Batley, Ltd., Albion Works, Leeds.
Holmes, J. H., & Co., Portland Road, Newcastle-on-Tyne.
Mather & Platt, Ltd., Manchester.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

ELECTRIC MOTORS—
Boothroyd, H. T., Ltd., Bootle, Liverpool.
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Greenwood & Batley, Ltd., Albion Works, Leeds.
Holmes, J. H., & Co., Portland Road, Newcastle-on-Tyne.
Mather & Platt, Ltd., Manchester.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

ELECTRIC WIRES—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.

ELECTRICAL CONTRACTORS—
Holmes, J. H., & Co., Portland Road, Newcastle-on-Tyne.
Low, Archibald, & Sons, Ltd., 78, Merkland Street, Partick, Glasgow. [Glasgow.
Martin, W. C., & Co., 10, West Campbell Street,
Mather & Platt, Ltd., Manchester.
Sunderland Forge & Engineering Co., Ltd. Sunderland.

ELECTRICAL ENGINEERS—
Boothroyd, H. T., Ltd., Bootle, Liverpool.
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Chadburn's (Ship) Telegraph Co., Ltd., Cyprus Road, Bootle, Lancs.
Graham, Alfred, St. Andrew's Works, Crofton Park Road, S.E.
Holmes, J. H., & Co., Portland Road, Newcastle-
Mather & Platt, Ltd., Manchester. [on-Tyne.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

ELECTRICAL INSTRUMENTS (Ammeters)—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

ELECTRICAL INSTRUMENTS (Circuit Breakers)—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

ELECTRICAL INSTRUMENTS (Relays)—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

ELECTRICAL INSTRUMENTS (Voltmeters)—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

EMERY WHEELS—
Sterne, L., & Co., Ltd., Crown Iron Works, Glasgow.

ENAMEL MANUFACTURERS—
Holzapfels, Ltd., Newcastle-on-Tyne.
Wailes Dove Bitumastic Ltd., 5, St. Nicholas Buildings, Newcastle-on-Tyne.
Websters Ltd., Hull.

ENGINE (Electric Light)—
Pelliss & Morcom, Ltd., Birmingham.
Greenwood & Batley, Ltd., Albion Works, Leeds.

ENGINES (Marine)—
Allen, W. H., Son & Co., Ltd., Queen's Engineering Works, Bedford.
Central Marine Engine Works, West Hartlepool.
Fair, Walter D., & Co., 43, Leicester Square, London, W.C.
Hawthorn, R. & W., Leslie & Co., Ltd., St. Peter's, Newcastle-on-Tyne
Howden, James, & Co., Ltd., Scotland St., Glasgow.
Perman & Co., Ltd., 82-83, Fenchurch Street, E.C.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.

ENGINE & DECK STORES—
McGeoch, Wm. & Co., Ltd., 28, West Campbell Street, Glasgow.
Metallic Valve Co., Colonial House, Water Street, Liverpool.

ENGINE AUXILIARIES—
Aspinall's Patent Governor Co., 7, Strand Street, Liverpool.

ENGINE FITTINGS—
Aspinall's Patent Governor Co., 7, Strand Street, Liverpool.
McRobie, John, & Sons, 94, Elliott Street, Cranstonhill, Glasgow.

ENGINE-ROOM OUTFITS—
Grieve, T., & Sons, Bedford Street, North Shields.

ENGRAVERS—
Brown, Robert, & Co., 12, Espedair St., Paisley.

EVAPORATORS—
Central Marine Engine Works, West Hartlepool.
Richardsons, Westgarth & Co., Ltd., Hartlepool.
Royles, Ltd., Irlam, Nr. Manchester.
Weir, G. & J., Ltd., Cathcart, Glasgow.

EXTRUDED METALS (Brass, Bronze, Copper, Delta Metals)—
Delta Metal Co., Ltd., E. Greenwich, London, S.E.

FANS—
Adam, J. M., & Co., Greenfield Iron Works, Dalmarnock, Glasgow.
Allen, W. H., Son & Co., Ltd., Queen's Engineering Works, Bedford.
Boothroyd, H. T., Ltd., Bootle, Liverpool.
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg., Co., Ltd., Trafford Park, Manchester. [Belfast.
Davidson & Co., Ltd., Sirocco Engineering Works,
Hogan & Wardrop, 2, Gresham Buildings, Basinghall Street, London, E.C.
Keith, James, & Blackman Co., Ltd., 27, Farringdon Avenue, London, E.C.

FEED-WATER HEATERS—
Beresford Eng'n'ring Co., Beresford Lane, Cardiff.
Central Marine Engine Works, West Hartlepool.
Richardsons, Westgarth & Co., Ltd., Hartlepool.
Royles, Ltd., Irlam, Nr. Manchester.
Weir, G. & J., Ltd., Cathcart, Glasgow.

FILES—
Brown, John, & Co., Atlas Works, Sheffield.
Spencer, John, & Sons, Ltd., Newburn-on-Tyne.

FILTERS (Marine)—
Central Marine Engine Works, West Hartlepool.
Cockburns, Ltd., Cardonald, Nr. Glasgow.
Mather & Platt, Ltd., Manchester.

FIREBARS—
Liverpool Patents Co., Ltd., Derby Square, James Street, Liverpool.

FIRE EXTINGUISHERS—
Low, Archibald, & Sons, Ltd., 78, Merkland Street, Partick, Glasgow.
Mather & Platt, Ltd., Manchester.

FIRE-FIGHTING APPLIANCES—
Mining Engineering Co., Ltd., Meco Works, Sheffield.

FLAGS—
Speedings, Ltd., Sail Works, Sunderland.

FLOATING DOCKS—
Chalmers, Wm., & Co., Ltd., Rutherglen, Nr. Glasgow. [Scotland.
Hamilton, Wm., & Co., Ltd., Port Glasgow,
Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne.

FLOOR COVERING—
Docker Bros., Ltd., Metropolitan Road, Saltley, Birmingham.

FORCED DRAUGHT—
Adam, J. M., & Co., Greenfield Iron Works, Dalmarnock, Glasgow. [Belfast.
Davidson & Co., Ltd., Sirocco Engineering Works,
Howden, J., & Co., Ltd., Scotland Street, Glasgow.
Keith, James, & Blackman Co., Ltd., 27, Farringdon Avenue, London, E.C.

FORGING PRESSES—
Berry, Henry, & Co., Ltd., Croydon Works, Leeds.
Mactaggart, Scott & Co., Ltd., Loanhead, Edinburgh.

FORGINGS—
Brown, John & Co., Ltd., Atlas Works, Sheffield.
Darlington Forge Co., Ltd., Darlington.
Hingley & Sons, Ltd., Netherton Iron Works, Staffs.
Sunderland Forge & Engineering Co., Ltd., Sunderland.

FORGINGS (Bronze)—
Delta Metal Co., Delta Works, East Greenwich, London, S.E.

FORGINGS (Steel)—
Brown, John, & Co., Ltd., Atlas Works, Sheffield.
Darlington Forge Co., Ltd., Darlington.
Spencer, John, & Sons, Ltd., Newburn-on-Tyne.

FUMIGATORS—
Low, Archibald, & Sons, Ltd., 78, Merkland Street, Partick, Glasgow.

FURNACE BRIDGES—
Hamilton, A., & Sons, 13, Bute Crescent, Docks, Cardiff.
McConwell, A., & Co., Ltd., 60, Drury Buildings, Water Street, Liverpool.

FURNACES—
Brown, John, & Co., Ltd., Atlas Works, Sheffield.
Deighton's Patent Flue & Tube Co., Ltd., Vulcan Works, Pepper Road, Leeds.
Leeds Forge Co., Ltd., Leeds.
Piggott, T., & Co., Ltd., Birmingham.

GALLEY GEAR—
Grieve, T., & Sons, Bedford Street, North Shields.

GALVANIZERS—
Braby, F., & Co., Ltd., Eclipse Works, Glasgow.

GAS ENGINES—
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Mather & Platt, Ltd., Manchester.

GAUGES—
Chatwin, Thos., Ltd., Gt. Tindal St., Birmingham.

GEAR CUTTING—
Campbells & Hunter, Ltd., Dolphin Foundry, Leeds.

GEARING—
Campbells & Hunter, Ltd., Dolphin Foundry, Leeds

GEARS—
Spencer, John, & Sons, Ltd., Newburn-on-Tyne.

GEARS (Noiseless or Silent)—
British Thomson-Houston Co., Ltd., Rugby.
Brown, David, & Sons (Hfd.), Ltd., Huddersfield.

GOVERNORS—
Aspinall's Patent Governor Co., 7, Strand Street, Liverpool.

GRAIN DISCHARGING PLANT—
Spencer & Co., Ltd., Melksham Wilts.

GRINDING MACHINES—
Greenwood & Batley, Ltd., Albion Works, Leeds.

GRINDING WHEEL MACHINES—
Sterne, L., & Co., Ltd., Crown Iron Works, Glasgow

HATCH COVERS (Patent)—
Hogg-Carr Construction Co., Ltd., Newcastle-on-Tyne.

HEATING APPARATUS—
Royles, Ltd., Irlam, Nr. Manchester.
Saunders & Taylor, Ltd., 43, Lower Mosley Street, Manchester.

HEATING ENGINEERS—
Low, Archibald, & Sons, Ltd., 78, Merkland Street, Partick, Glasgow.
Royles, Ltd., Irlam, Nr. Manchester.
Saunders & Taylor, Ltd., 43, Lower Mosley Street, Manchester.

HELM SIGNAL TELEMOTORS—
Mactaggart, Scott & Co., Ld., Loanhead, Edinburgh.

HIGH SPEED DRILLS—
Brown, John, & Co., Atlas Works, Sheffield.

HIGH SPEED STEEL—
Brown, John, & Co., Atlas Works, Sheffield.

HOISTS—
Mather & Platt, Ltd., Manchester.
Stothert & Pitt, Ltd., Bath.
Waygood-Otis, Ltd., Falmouth Road, S.E.

BUYERS' GUIDE—*continued.*

HOSE—
Heinke, C. E., & Co., 88, 89, Grange Road, Bermondsey, London, S.E.

HYDRAULIC CRANES—
Berry, Henry, & Co., Ltd., Croydon Works, Leeds.
Brown Brother & Co., Ltd., Rosebank Iron Works, Edinburgh.
Mactaggart, Scott & Co., Ld., Loanhead, Edinburgh

HYDRAULIC MACHINERY—
Berry, Henry, & Co., Ltd., Croydon Works, Leeds.
Waygood Otis, Ltd., Falmouth Road, S.E.

HYDRANTS—
McRobie, John, & Sons, 94, Elliott Street, Cranstonhill, Glasgow.

INDIARUBBER—
Heinke, C. E., & Co., 88, 89, Grange Road, Bermondsey, London, S.E.

INDICATORS—
Robinson, A., & Co., Ltd., Bootle, Liverpool.

INDUCED DRAUGHT—
Davidson & Co., Limited, Sirocco Engineering Works, Belfast.
Keith, James, & Blackman Co., Ltd., 27, Farringdon Avenue, London, E.C.

INSULATIONS—
Jones, Fredk., & Co., Ltd., Perren Street, Kentish Town, N.W. [Liverpool.
Liverpool Refrigeration Co., Ltd., Colonial House,

IRON ROOFS AND BUILDINGS—
Braby, F., & Co., Ltd., Eclipse Works, Glasgow.

JOINTING MATERIAL (Manganesite)—
Hudson & Co.'s Successors, John, 15, Victoria Warehouses, Mansell Street, E.C.

LAMPS AND LIGHTS—
Grieve, T., & Sons, Bedford Street, North Shields.
Kaye, Joseph, & Sons, Ltd., Leeds.

LAUNCHES—
Crichton, J., & Co., Saltney Shipyard, Chester.
Leitch, John, & Co., The Ferry, Renfrew, Scotland.
Livingstone & Cooper, Ltd., Hessle, Hull.
MacLaren Bros., Ltd., Dumbarton.
Perman & Co., Ltd., 82-83, Fenchurch St., E.C.
Seamless Steel Boat Co., Ltd., Wakefield.
Thornycroft, John I., & Co., Ltd., Caxton House, Westminster, London, S.W.
Watson, J. S., Gainsborough.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.

LAUNDRY MACHINERY—
Bradford, T., & Co., Salford, Manchester.

LAVATORY FITTINGS AND APPLIANCES—
Levick, John, Alma Street, Aston, Birmingham.

LEAD (Sheets and Pipes)—
Rimer Bros., Newcastle-on-Tyne.

LEAD (White and Red)—
Rimer Bros., Newcastle-on-Tyne.

LIFEBELTS AND BUOYS—
Speedings Ltd., Sail Works, Sunderland.

LIFTS (Window)—
Laycock, W. S., Ltd., Victoria Works, Millhouses, Sheffield.

LIFTS AND HOISTS—
Mactaggart, Scott & Co., Ld., Loanhead, Edinburgh
Waygood-Otis, Ltd., Falmouth Road, S.E.

LIGHTERAGE—
Alexander, W. H. J., St. John's Wharf, Wapping, E.

LIGHTERS—
Chalmers, Wm., & Co., Ltd., Rutherglen, Nr. Glasgow.
Crichton, J., & Co., Saltney Shipyard, Chester.
Watson, J. S., Gainsborough.

LIMEWASHING & DISINFECTING MACHINES—
Stonehouse Works Co., Ltd., Houghton Street, West Bromwich.

LOCKS—
Kaye, Joseph, & Sons, Ltd., Leeds.

LOCOMOTIVE TUBES (Copper & Brass)—
Yorkshire Copper Works, Ltd., Leeds.

LUBRICATORS— [Cranstonhill, Glasgow.
McRobie, John, & Sons, 94, Elliott Street,

MACHINE TOOLS—
Campbells & Hunter, Ld., Dolphin Foundry, Leeds.
Greenwood & Batley, Ltd., Albion Works, Leeds.
Scriven & Co., Leeds Old Foundry, Leeds.

MACHINERY NAME PLATES—
Brown, Robert, & Co., 12, Espedair St., Paisley.

MAGNESIA—
Jones, Fredk., & Co., Ltd., Perren Street, Kentish Town, N.W.

MARINE ENGINEERS—
Bailey, C. H., Newport, Mon. Barry Docks.
Barry Graving Dock & Engineering Co., Ltd.,
Brown, John, & Co., Ltd., Clydebank, Nr. Glasgow.
Crichton, C. & H., Ltd., Huskisson Engine Works, Liverpool. [Southampton.
Day, Summers & Co., Ltd., Northam Ironworks,
Diamond, Thos., & Co., Cardiff.
Doxford, Wm., & Sons, Ltd., Sunderland.
Elliott & Jeffery, East Dock, Cardiff.
Gray, Wm., & Co., Ltd., West Hartlepool.
Harland & Wolff, Ltd., Belfast.
Harris Bros., Ltd., Cambrian Dry Docks, Swansea.
Hawthorn, R. & W., Leslie & Co., Ltd., Hebburn-on-Tyne.
Hill's Dry Docks & Engineering Co., Ltd., Cardiff.

MARINE ENGINEERS *(contd.)*—
Livingstone & Cooper, Ltd., Hessle, Hull.
Mountstuart Dry Docks, Ltd., Cardiff.
Perman & Co., Ltd., 82-83, Fenchurch St., E.C.
Richardsons, Westgarth & Co., Ltd., Hartlepool, Middlesbrough and Sunderland.
Shearman, John, & Co., Ltd., Cardiff.
Simons, Wm., & Co., Ltd., Renfrew, Nr. Scotland.
Stephen, Alex., & Sons, Ltd., Linthouse, Govan, Glasgow.
Swan, Hunter, & Wigham Richardson, Ltd., Wallsend-on-Tyne. [Westminster, S.W.
Thornycroft, John I., & Co., Ltd., Caxton House,
Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.
Workman Clark & Co., Ltd., Belfast.
Yarrow & Co., Ltd., Glasgow.

MARINE GOVERNORS—
Aspinall's Patent Governor Co., 7, Strand Street, Liverpool.

MARKING-OFF TABLES—
Campbells & Hunter, Ltd., Dolphin Foundry, Leeds.

MATTRESSES—
Stewart, Archibald, & Co., 40-48, Union St., Glasgow

METALLIC PACKING—
Asbestos Cement & Brick Co., Ltd., Erdington, Birmingham.
Beldam Packing & Rubber Co., Ltd., 1 and 2, Gracechurch Street, London, E.C.
McConnell, A., & Co., Ltd., 60, Drury Buildings, Water Street, Liverpool.
United States Metallic Packing Co., Ltd., Bradford

METAL SPINNINGS—
Levick, John, Alma Street, Aston, Birmingham.

METALS (Patent)—
Bowran, Robt., & Co., Ltd., Newcastle-on-Tyne.
Delta Metal Co., Ltd., Delta Works, East Greenwich, L.

MOTOR BOATS—
Crichton, J., & Co., Saltney Shipyard, Chester.
Leitch, John, & Co., The Ferry, Renfrew, Scotland.
Livingstone & Cooper, Ltd., Hessle, Hull.
MacLaren Bros., Ltd., Dumbarton.
Perman & Co., Ltd., 82-83, Fenchurch St., E.C.
Seamless Steel Boat Co., Ltd., Wakefield.
Thornycroft, John I., & Co., Ltd., Caxton House, Westminster, London, S.W.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.

MOTOR STARTING AND CONTROL GEAR— [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

NAVAL ARCHITECTS' SUPPLIES—
Walker, Jas., & Co., 11, Bishop Court, Anderston, Glasgow.

OIL CANS—
Kaye, Joseph, & Sons, Ltd., Leeds.

OIL ECONOMISERS—
Kaye, Joseph, & Sons, Ltd., Leeds.

OIL ENGINES—
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester.
Edina Manufacturing Co., 19b, Broad Wynd, Leith.
Fair, Walter D., & Co., 43, Leicester Square, London, W.C.
Perman & Co., Ltd., 82-83, Fenchurch Street, E.C.
Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne.
Thornycroft, John I., & Co., Ltd., Caxton House, Westminster, S.W.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.

OIL-FUEL INSTALLATION—
Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.

OIL IMPORTERS & BLENDERS—
Rimer Bros., Newcastle-on-Tyne.

PACKING (Engine)—
Beldam Packing & Rubber Co., Ltd., 1 and 2, Gracechurch Street, London, E.C.
Walker, Jas., & Co., Ltd., Lion Works, Garford Street, West India Dock Road, E.

PAINTS—
Briggs, W., & Sons, Ltd., Dundee.
Cocks, Harry, & Co., Cardiff.
Hamilton, Archd., & Co., Possilpark, Glasgow.
Hoyle, Robson, Barnett, & Co., Ltd., St. Nicholas Chambers, Newcastle-on-Tyne.
Wailes Dove Bitumastic Ltd., 5, St. Nicholas Buildings, Newcastle-on-Tyne.
Websters Ltd., Hull.

PANELLING—
Stewart, Archibald, & Co., 40-48, Union St., Glasgow

PATENT HAWSE PIPE AND DECK FLANGE—
Hamilton, A., & Sons, 13, Bute Crescent, Docks, Cardiff.

PERFORATED METALS—
Braby, F., & Co., Ltd., Eclipse Works, Glasgow.
Piggott, T., & Co., Ltd., Birmingham.

PIPES—
Stewarts & Lloyds, Ltd., 41, Oswald St., Glasgow.
Yorkshire Copper Works, Ltd., Leeds.

PLANING MACHINES for Plate Edges—
Scriven & Co., Leeds Old Foundry, Leeds.

PLATE BENDING ROLLS—
Scriven & Co., Leeds Old Foundry, Leeds.

PORCELAIN ENAMELLED CAST IRON—
Levick, John, Alma Street, Aston, Birmingham.

PROPELLERS—
Billington & Newton, Ltd., Longport, Staffs.
Crichton, C. & H., Ltd., Huskisson Engine Works, Liverpool.
Darlington Forge Co., Ltd., Darlington.
Spencer, John, & Sons, Ltd., Newburn-on-Tyne.

PROPELLER BLADES—
Darlington Forge Co., Ltd., Darlington.
Stewarts & Lloyds, Ltd., 41, Oswald St., Glasgow.

PUBLICATIONS—
Syren & Shipping, Limited, Queen Anne's Chambers, Westminster, London, S.W.

PULLEY BLOCKS—
Hall, James & Co., Hurst Street, Liverpool.
Wright, Joseph, & Co., Ltd., Tipton, Staffs.

PUMPS—
Allen, W. H., Son & Co., Ltd., Queen's Engineering Works, Bedford.
Beresford Eng'n'ring Co., Beresford Lane, Cardiff.
Berry, Henry, & Co., Ltd., Croydon Works, Leeds.
Central Marine Engine Works, West Hartlepool.
Davey & Co. (Chemical), Ltd., 78, West India Dock Road, E.
Dawson & Downie, Elgin Works, Clydebank.
Edina Manufacturing Co., 19b, Broad Wynd, Leith.
Hall, J. P., & Sons, Ltd., Peterborough.
Mather & Platt, Ltd., Manchester.
Weir, G. & J., Ltd., Cathcart, Glasgow.

PUNCHING AND SHEARING MACHINES—
Scriven & Co., Leeds Old Foundry, Leeds.

RADIATORS—
British Thomson-Houston Co., Ltd., Rugby.
Low, Archibald, & Sons, Ltd., 72, Mitchell Street, Partick, Glasgow.
Royles Ltd., Irlam, Nr. Manchester.

RADIATOR TUBES—
Yorkshire Copper Works, Ltd., Leeds.

REAMERS—
Chatwin, Thos., Ltd., Gt. Tindal St., Birmingham.

REFRIGERATING MACHINERY—
Hall, J. & E., Ltd., Dartford Ironworks, Kent.
Liverpool Refrigeration Co., Ltd., Colonial House, Liverpool.
Sterne, L. & Co., Ltd., Crown Ironworks, Glasgow.

RESCUE APPLIANCES—
Mining Engineering Co., Ltd., Meco Works, Moorfields, Sheffield.

REVERSING ENGINES (Direct-Acting Type)— [Works, Edinburgh.
Brown Brothers & Co., Ltd., Rosebank Iron
Mactaggart, Scott & Co., Ld., Loanhead, Edinburgh

RHEOSTATS & RESISTANCES (all kinds)—
British Thomson-Houston Co., Ltd., Rugby.
British Westinghouse Electric & Mfg. Co., Ltd., Trafford Park, Manchester. [on-Tyne.
Holmes, J. H., & Co., Portland Road, Newcastle-

ROUND AND OVAL HOLE CUTTING-OUT MACHINES—
Campbells & Hunter, Ltd., Dolphin Foundry, Leeds.

RUBBER GOODS—
Heinke, C. E., & Co., 88, 89, Grange Road, Bermondsey, London, S.E.

RUBBER HOSE—
Heinke, C. E., & Co., 88, 89, Grange Road, Bermondsey, London, S.E.

RUSTLESS IRON—
Braby, F., & Co., Ltd., Eclipse Works, Glasgow.

SAFE MANUFACTURERS—
Whitfield's Safe & Door Co., Oxford Street, Birmingham.

SALOON LIGHTS—
Laycock, W. S., Ltd., Victoria Works, Millhouses, Sheffield.

SALVAGE—
Alexander, W. H. J., St. John's Wharf, Wapping, E.

SANITARY FITTINGS AND APPLIANCES—
Levick, John, Alma Street, Aston, Birmingham.

SCREWING MACHINES—
Chatwin, Thos., Ltd., Gt. Tindal St., Birmingham.

SHAFTING—
Brown, John, & Co., Ltd., Atlas Works, Sheffield.
Darlington Forge Co., Ltd., Darlington.
Spencer, John, & Sons, Ltd., Newburn-on-Tyne.

SHAPING MACHINES—
Greenwood & Batley, Ltd., Albion Works, Leeds.

SHEAVES—
Higginson & Co., 7, Hurst Street, Liverpool.

SHEERS, TRAVERSING (Land and Floating)—
Day, Summers & Co., Ltd., Northam Ironworks, Southampton.

SHIP APPLIANCES—
Linkleter's Patent Ship Fittings Co., 20, Percy Street, Tynemouth.

SHIP BROKERS—
Walford, Leopold (London) Ltd., 29, Gt. St. Helens E.C.

SHIP BROKERS (Sale and Purchase)—
Pinkney, Thos., & Sons, Sunderlar
Walford, Leopold (London) Ltd., 29, Gt St. Helens, E.C.

BUYERS' GUIDE—*continued.*

SHIPBUILDERS—
Brown, John, & Co., Ltd., Clydebank, Nr. Glasgow.
Chalmers, W., & Co., Ltd., Rutherglen, Nr. Glasgow.
Crichton, J., & Co., Saltney Shipyard, Chester.
Day, Summers & Co., Ltd., Northam Ironworks, Southampton.
Doxford, Wm., & Sons, Ltd., Sunderland.
Gray, Wm., & Co., Ltd., West Hartlepool.
Hamilton, Wm., & Co., Ltd., Port Glasgow.
Harland & Wolff, Ltd., Belfast.
Hawthorn, R. & W., Leslie & Co., Ltd., Hebburn-on-Tyne.
Hogg-Carr Construction Co., Ltd., Newcastle-on-Tyne.
Isherwood, J. W., 4, Lloyd's Avenue, London, E.C.
Livingstone & Cooper, Ltd., Hessle, Hull.
Simons, Wm., & Co., Ltd., Renfrew, Nr. Scotland.
Stephen, Alex., & Sons, Ltd., Linthouse, Govan, Glasgow.
Swan, Hunter, & Wigham Richardson, Ltd., Wallsend-on-Tyne. [Westminster, S.W.
Thornycroft, John I., & Co., Ltd., Caxton House,
Watson, J. S., Gainsborough.
White, J. Samuel, & Co., Ltd., East Cowes, I.W.
Workman Clark & Co., Ltd., Belfast.
Yarrow & Co., Ltd., Glasgow.

SHIP CONSTRUCTION—
Brown, John, & Co., Ltd., Clydebank, Nr. Glasgow.
Hogg-Carr Construction Co., Ltd., Newcastle-on-Tyne.
Isherwood, J. W., 4, Lloyd's Avenue, London, E.C.
Simons, Wm., & Co., Ltd., Renfrew, Nr. Scotland.
Swan, Hunter, & Wigham Richardson, Ltd., and Maxwell Ballard, Wallsend Shipyard, Wallsend-on-Tyne.

SHIP FURNISHINGS & FITTINGS—
Cocks, Harry, & Co., Cardiff.
Davey & Co. (London), Ltd., 88, West India Dock Road, E.
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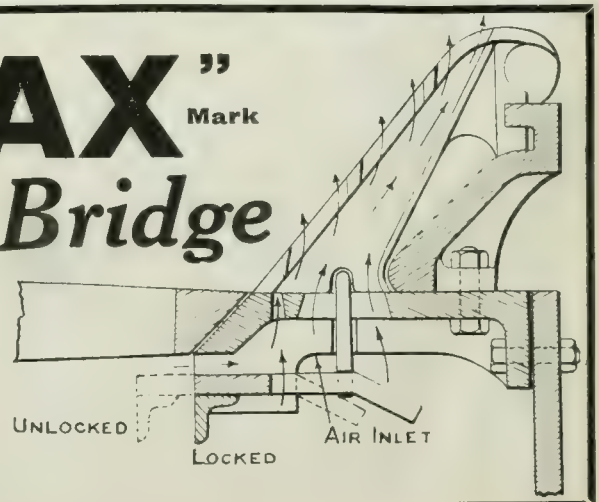

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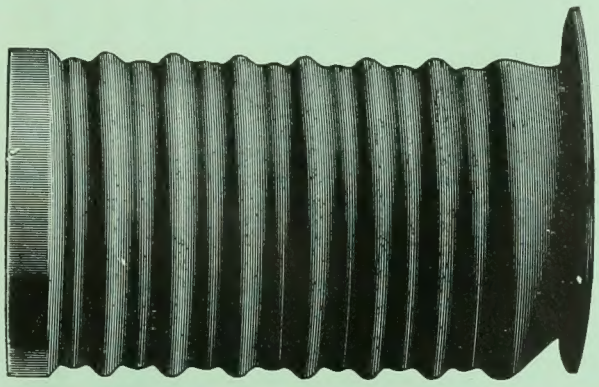

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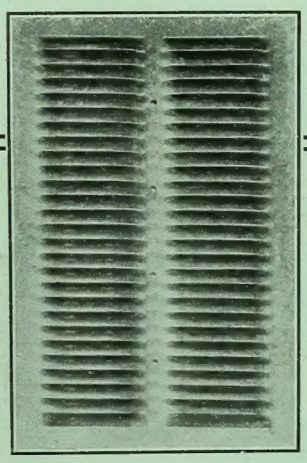

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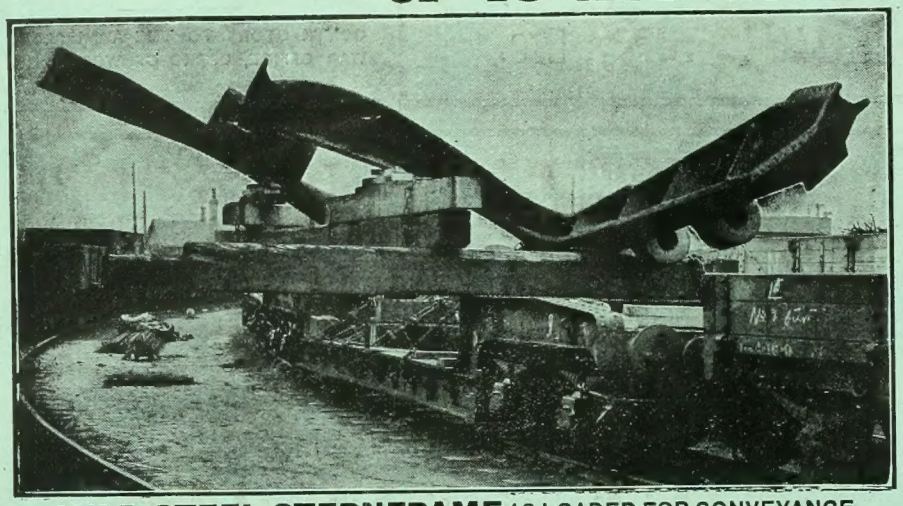

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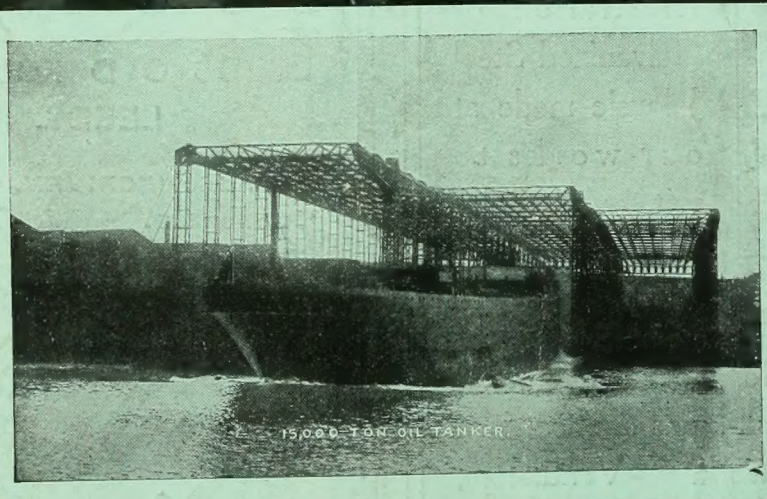

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